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Champion Water Wheel Governor.

The following plates represent a new improved patent governor for regulating the speed of water wheels, and, is, the inventor assures us, the most accurate, reliable, durable and simple machine of its class before the public, being made of the best materials, all iron and steel, and constructed in the most substantial manner. It is a complete portable machine—in every respect a first-class water wheel governor. The letters in the plate represent the different parts as follows: A, fig. 3, is the vertical shaft, which revolves the balls, driven by a pulley, shaft and bevel gearing, shown in fig. 1. The balls as their orbit widens or narrows, moves the collar, B, vertically, in the ordinary way. This movement of the collar actuates the bell crank lever, C. To the bell crank lever is pivoted the connecting rod, D, which is also pivoted to the shield, E, fig. 1 and 3. This shield consists of a disk, as in figs. 1 and 3, which has a rim upon its edge turned down at right angles. This rim covers the toothed wheel, F, figs 1 and 3, but has a notch cut in its lower part, as shown in fig. 3. To understand the office of this shield, we must now refer to the eccentric, G, fig. 3. With each revolution of the ball shaft, this eccentric, through the connecting rod H, reciprocates a cross head carrying the gravity pawls, I. One or the other of these pawls engages the toothed wheel, F, according as the notch in the rim of the shield permits the engagement. As the collar B, fig. 3, moves up and down with variations of speed, the shield is moved by the connecting rod, D, above described, so that the notch in the shield permits the proper pawl to act.

The toothed wheel. F, fig. 1, is fixed to the shaft, J, which is connected to the gate shaft by bevel gearing.

It is obvious that when the notch in the shield stands midway between the pawls, I, that neither of the pawls can act. The arm carries a pin, L. By the continued action of the pawl that raises the gate, the nut, K. is run along the thread on J, till it finally abuts against a shoulder turned on the shaft, and then turns with the shaft. At the same time the pin, L, is brought under the lug, M, formed on the hub of the shield. The shield is thus turned so as to bring the notch to the centre, where, as neither of the pawls can act, the gate cannot be further raised. As soon as the speed of the general shafting, to which the governor is belted, increases, the action of the collar, B, and bell crank, C, fig. 3, moves the notch off the centre so that the proper yawl to lower the gate acts as before.

In setting the regulator observe that the ratchet turns toward the frame to open the gate, and must take from three to eight revolutions to open a full gate on the wheel from the time the gate is closed until it is fully open. On small powers the ratchet must make the fewest revolutions, and on large powers

Fig. 1.

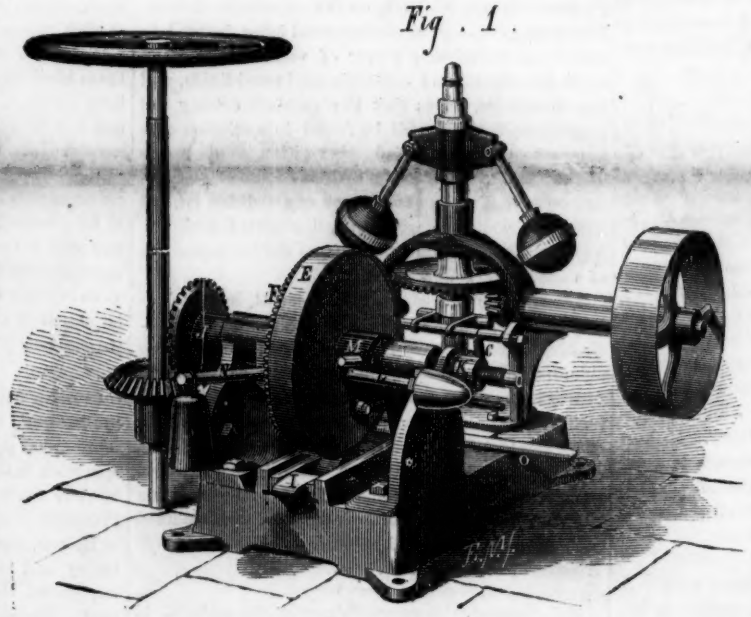
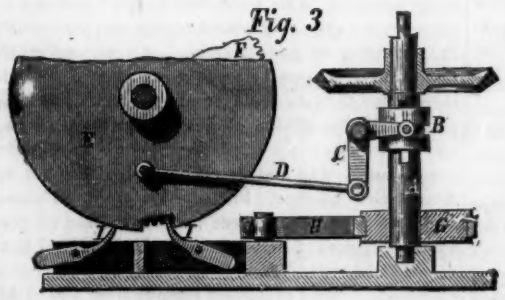


Fig. 3



most. The gate gears must be keyed to the gate stem, or shaft, where the gate is to be operated, and must be always in gear with the regulator. The stop motion, or nut, must be brought up to the shoulder on the ratchet shaft when the gate is fully open, as it relieves the gate by raising the balls of the governor when it is fully open, and at the same time leaves the regulator free to close the gate when high speed is indicated by the governor. The lever which detaches the pawl from the ratchet must be thrown toward the frame when the gate is to be closed by hand to stop the wheel. If the ratchet shows a tendency to give back with the motion of the pawls or dogs that turn it, the friction box on the hub of the ratchet must be tightened, by means of a lever or weight, enough to take up its back motion. If the friction lever needs much weight to take up the backward tendency of the ratchet, it will be well to take off the weight when the gate is to be operated by eand. The stand bolted to the side is designed to be bored to fit any gate stem, and thereby form a bearing close to the gate gears. If the regulator cannot be placed as represented in the cut, a method can be devised, with the exercise of some judgment, that will be adapted to the circumstances. A proper fountain for the regulator to rest on is always desirable.

This governor, which is constantly gaining in popnlarity, has been in operation now nearly four years, and it is hardly possible to suggest where an improvement can be made, either in the efficient working. or durability of the machine. Now every practical man knows that in the manufacture of all kinds of fabrics it is of the first importance that the speed should be constantly and accurately regulated, as it is impossible to attain to anything near perfection otherwise, and in small as well as large manufactories the loss of time occasioned by varying speeds is an item of no small magnitude. In placing this governor before the public the inventor have reason to feel the utmost confidence in the merits of the machine as a first class and in every respect complete wheel regulator, and this not alone because of the constantly accumulating and unsolicited testimonials, but from four years successful operation.

It is also a desirable machine on account of its extreme simplicity. Not only this should render the regulator popular, but the prices are the lowest, taking the quality of the work into consideration, of any built in the United States.

In ordering a regulator it is always well when possible, to state the kind and horse-power of the wheel, what kind of machinery is being driven, and if the wheel is worked to nearly its full capacity; the number of turns the gate stem or hand wheel makes to open full gates on the wheel where the regulator is to be attached, as this will enable the proper gears to be sent to operate the gates of the wheel scientifically.

Address James Leffel & Co., Springfield, Ohio, or 109 Liberty street, New York City.

Chemical Repertory.

No. 84.—January 16, 1873.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

602. Diamond Stone-Saw.—At the last Fair of the American Institute, this machine was shown. The inventor's name is Young. The *Engineering and Mining Journal* describes it:

"A broad blade of steel has, at certain intervals, pieces of soft steel placed in its edge, and projecting say three eighths of an inch. These contain black diamonds, usually three to each holder. As the saw is drawn over the surface of the stone the diamonds make a deep cut, but in the return stroke they are lifted clear of the stone. By this method the cuttings are all drawn gradually to one end, instead of being shoved back and forth in the cut. The machine does beautiful work. It leaves the surfaces free from saw marks and ready for the polishing stone. The edges are unbroken, and the stone, if for building purposes, is ready to set without further preparation. Specimens of its work in all kinds of stone were exhibited, with the time of sawing marked on them. They were indeed admirable pieces of work. This new use of the diamond is one that appears to have a bright future before it. It is noticeable that the diamond as a cutting instrument makes no headway outside of America. The diamond drill is hardly a subject of experiment in Europe. But here we have proved its value, while they are talking about the results being "still doubtful." With this new diamond tool in operation stone working in America will have facilities that may be of the greatest service in encouraging the increased employment of stone as a building material."

603. Alcohol from Iceland Moss.—In St. Petersburg and the northern provinces of Russia generally this branch of industry has become quite extensive. In Finland, Archangel, Pskow and Novgorod brandy and alcohol were manufactured from the mosses and lichens growing there. The manufacture of lichen and moss spirits began in Sweden, and from there went over to Finnland. At the last Russian Industrial Exhibition, specimens of the alcohol were exhibited which were made in the distillery at Wincilas, and from the Lewin manufactory in the city of Borgo, as well as from the factory of Zadler, and of Count Tabirki, in St. Petersburg, German, English and French manufacturers were well pleased with its quality. In Northern Russia this branch of industry brings in a net profit of 100 per cent. The more alcohol there is made from Iceland moss the more cereal grains will there be left for the food of the inhabitants.

604. Poison or not Poison? Carbolic Acid.—In our two previous issues we have had letters from English manufacturers asserting the innocuous character of carbolic acid externally, in opposition to the opinions of many. Internally also, its action has been disputed. We take another note on the subject from the *Jour. of Applied Chemistry:*

Homberg has ventured to assert that pure carbolic acid is not a poison, and that the poisonous properties of ordinary commercialacid are due to impurities in it. To this view Husemann takes exception, and publishes the results of a series of experiments made with rabbits, in which all specimens of carbolic acid acted as poison, whether taken into the stomach or injected into the circulation. In these experiments he used the No. 1 acid of Calvert, in Bradford, and of De Haven, in List, near Hanover. He also purified the acid by Church's method, viz.:

Partially dissolving the acid in an insufficient quantity of water (1 part in 25), whereby only the carbolic acid is dissolved, none of the foreign substances being taken up. From this solution the acid is precipitated by supersaturating it with common salt. This purified acid had no unpleasant odor, but was as poisonous as the crude, while the impurities removed were not more poisonous.

Husemann attributes the contrary result of Homberg's experiments to his using too small doses at first, to the animals becoming accustomed to the action of the acid being given mixed with flour, which might neutralize its action like coagulated albumen, or to its being administered on a full stomach. In Homberg's experiments with subcutaneous injections, he used concentrated acid, which cauterized the surfaces, and also may have partially combined with the albumen of blood. Husemann found that always resulted from the injection of dilute acid.

605. Water Supply of Cities.—From a brief report of the proceedings of the Municipal Council of Nismes, France, we take the following, indicating the quantity of potable water supplied daily to the undermentioned places for each head of inhabitants. We have calculated the figures to U. S. gallons, for the behoof of our readers:

		Gallons.
	Ancient Rome	400
	Rome of present day	238
	New York	95
France.	Carcasonne	106
France.	Besancon	72
France.	Dyon	72
France.	Bourdeaux	45
France.	Paris, at present	66
France.	" in 1871	33
	London	26
	Lyons	23
	Brussels	21
	Geneva	20
	Nismes	53

606. Chloride of Calcium as a Disinfectant.—Professor Sidney W. Rich, on the experience derived from a large amount of experimental labor devoted to a study of the relative power of various salts when applied to animal and vegetable solids and fluids, and also to sewage, states that the greatest efficacy and general applicability will be found in a solution containing hydrochlorate of alumina with a small quantity of chloride of iron. The hydrochlorate of alumina will serve to do the general work of a disinfectant and antiseptic, while the iron salt will absorb the sulphuretted compounds which arise from the decomposition of some kinds of organic matter.

The chloride of calcium is the cheapest, inasmuch as it is a waste product in all alkali works. In this particular, hydrochlorate of alumina will, however, be able to compare favorably in the future, as the result of late improvements in the manufacture of alum will be to cause the manufacture of large quantities as a waste product.

In recommending chloride of calcium as a disinfectant, Mr. Stanford recommends that the solution should contain 25 per cent. of the solid salt, acidified with 12 per cent. of hydrochloric acid.—*Scientific American.*

607. Domestic Goods.—Domestic discomforts, in many cases, are to be attributed to the ignorance of wives on the subject of housekeeping, and particularly in the matter of good cooking. An uncomfortable home and ill-prepared meals drive many a man to take refuge from domestic troubles in convivial company. The knowledge of French, drawing, dancing and music does not fit a marriageable girl to superintend a household; and an acquaintance with the various duties of domestic life forms an important branch of female education. These views have been adopted by the directors of the Santa Clara Agricultural Society of California. These gentlemen, at their recent exhibition, offered premiums ranging from $10 to $40 to the unmarried girls who would prepare the best plain dinners, not to exceed the cost of $4. A committee was appointed to examine the tables, test the quality of the viands provided, decide upon their respective merits, and award the prizes.—*Scientific American.*

Two little "goaks" will serve to wind this up with:

—Jacksonville, Tenn., young ladies tie up their taper fingers, and when the young gentlemen callers in the evening inquire the cause, blushingly reply: "I burnt them while broiling the beefsteak this morning."

—It is said that iron is a good tonic for debilitated young ladies. That may be so, but ironing is a better one.

608. Utility of Science.—The *World* says that Professor Agassiz is quoted as authority for the startling calculation that in less than nineteen centuries from the present date Lake Erie will be quite emptied of water. In view of this prediction, it is reported that the hackmen and guides at Niagara Falls have resolved upon a still further increase of their charges, in order that they may lay by something from their earnings before their business is brought to an end.

609. Photographing the Pulse.—The ingenious apparatus invented by Dr. Ozanam of Paris, for rendering the variable beatings of the pulse visible, is already proving itself of practical value. It consists of a camera lucida, about 10 inches wide, in which a piece of mechanism, moving at a uniform rate, pushes a glass plate, prepared with collodion, in front of a very narrow aperture exposed to the light. In this aperture is a glass tube, in which a column of mercury may rise or fall as in a thermometer. By attaching to the wrist a rubber tube, filled with mercury, in connection with the tube of the apparatus, the beating of the pulse as received on this artificial artery, and the pulsations are transmitted to the recording apparatus. As the column in the tube acts as a screen, light can penetrate the aperture only where the column is deficient; consequently the prepared plate becomes black under the influence of light everywhere except at such places as the column intercepts it. As the column rises and falls with each pulsation of the heart, these black lines on the prepared plate, pushed regularly forward, will be longer or shorter alternately, and will be successively photographed as being lines perpendicular to a common base, the heart being made to register photographically its own pulsations. These photographic representations can be so magnified as to be rendered visible across a large amphitheater; and such is the peculiarity of the apparatus, in its adaptation to different uses, that it may be modified so as to register the variations of respiration, the irregular action of coughing, and similar physiological and pathological phenomena.—*Sci. Press.*

610. No Small Beer.—According to the reports o the Brewer's Congress, held in New York last year, there are at present over three thousand breweries in operation in the United States, employing over $100,000,000 capital. According to the statement of the President of the Brewers' Association, lately in session in Boston, the trade consumes 25,000,000 bushels of barley, and 18,000,000 pounds of hops annually, which require for their cultivation over a million acres of land. The revenue derived from the business in 1870 exceeded $6,500,000, and in 1871 over 7,800,000, with a prospect of a large increase in 1872. The amount of fermented liquor brewed during the year ending June 30, 1871, was 7,159,740 barrels, being an average of 92 glasses each to every man, woman and child in the country. Assuming the beer to have been consumed in the State in which it was manufactured, each individual in New Jersey averaged 292 glasses; in New York, 261 glasses, in Maine, probably on account of the liquor laws, 7½ glasses; and in Texas, but 5 glasses. The *American Artisan* curiously suggests that these data may be of value to our Teutonic fellow citizens in making a choice as to the States in which they may in future locate their beer manufactories.

611. Spontaneous Combustion.—Two very curious cases of this kind are lately related. M. Collet communicated to the French Academy an account of the spontaneous combustion of a wooden beam in a building at Ribemont (Aisne). The oak beam was found to be on fire during one of the hot days in the sum-

mer; it was directly exposed in an open yard to the concentrated heat of the sun's rays; the combustion, although proceeding slowly, was quite distinct, but was not attended with flame; the smoke, however, had a peculiar appearance, and on blowing the wood it burst into flame. The author asserts that the fire was entirely due to the heat of the sun.

The other case is related, in brief, as follows:

A piece of bituminous coal lying on some dry pine boards against the side of a building in Millport, N. Y., spontaneously burst into flames on one of the recent hot days. It had been exposed to the rays of the sun nearly all day, the thermometer ranging from 100 to 105° in the shade.

612. Cooking under Pressure.—Experiments by Professor Junichen prove that the time for cooking various articles of daily consumption is very much shorter when effected under strong pressure, while a great saving in fuel is also obtained.—*Scientific American.*

613. Coal-Cutting Machinery.—An item which is going the rounds we clip from the *Journal of the Franklin Institute:*

One of the difficulties incident to the introduction of coal-cutting machinery is the great cost in large mines of laying down pipes from the surface to convey the air into the pit, and thence to that part of the workings where the machinery happens to be in use.

To overcome this difficulty it has been proposed by Messrs. Simpson & Hurd to employ a portable air-compressor, to be used in any part of the mine, to be operated either by animal or manual power.

With regard to this, the *Engineering and Mining Journal* very pertinently asks, why use the compressed air at all in this case, and why not apply the animal power directly? There certainly seems a great absurdity somewhere here.

614. American Shampagne.—Dr. Van der Weyde, in the *Manufacturer and Builder*, tells the following tale:

"In regard to the difficulty of obtaining genuine Champagne, we can communicate the following facts, which have been communicated to us from a source which excludes all doubt concerning their veracity. A well-known wholesale wine-dealer, in New York, who also secretly manufactures champagne, did not want to dispense this on the occasion of the marriage of his daughter, but in order to obtain a genuine first-class article, ordered it from an importer of good reputation, in Boston. It arrived, and looked, in regard to labels, as a foreign article; but when the company were enjoying the champagne, he accidentally looked at one of the corks and found thereon his own private mark. He had been drinking his own wine, for which he had paid five times his own price; it had passed through several hands, labels changed, etc.

The small chance to get a genuine wine from the champagne district is best illustrated by the following simple facts:

"1st. There is more champagne sold and drank in France than is made in Champagne. 2nd. There is more champagne exported from France than is there produced. 3d. There is more champagne imported in the United States than there is exported from France. 4th. There is more so-called French champagne sold and drank in the United States than there is imported from anywhere. So it is seen, the chances for the genuine article are diluted fourfold."

615. Economical Italian Stove.—A newspaper correspondent describes this as follows:

"It is heated by coal, and consists of two small ovens, quite large enough to admit a good sized pie-dish or joint of meat; a boiler to contain half a gallon of water, and four receptacles for saucepans at top, all of which, it was asserted, could be heated with one pound of coal or coke. The same writer remarks that the price used to be 102 francs, but the increased cost of iron has brought the price up to 119 francs, while larger sizes, with more capacious ovens, and six holes for saucepads, cost 160 francs. If these statements are correct the economy is, indeed, remarkable.—*Iron Age.*

Important to Patentees---Judge Bradley's Opinion of Reissues.

Supreme Court of the United States.

Lamp Patent.

Carlton *et. al. vs.* Bokee.

In equity. Appeal from the Circuit Court of the United States for the District of Maryland.

Mr. Justice Bradley delivered the opinion of the Court:

William Carlton and the Bridgeport Brass Company, as assignees of Christian Reichmann, filed their bill in equity in the court below to restrain the defendant, maker of the Comet burner, from infringing a patent for an improvement in lamps, granted to Reichmann on the 21st of September, 1858, and reissued to Carlton and one Merrill on the 11th of August, 1868. The lamp as patented to Reichmann was one of a large number of attempts made about that time to utilize petroleum and its various products for purposes of illumination. The old lamps adapted to sperm oil, lard, and other gross and sluggish oils were unfitted for the use of so volatile and dangerous a substance. In them the flame was set close to the lamp, and the tube holding the wick was projected downward into the oil, so that the heat of the flame might be communicated thereto in order to render it susceptible to the capillary attraction of the wick. Such an arrangement as this with petroleum would have produced a speedy explosion. This article required that the flame should be elevated as far as possible above the lamp, and that the metallic wick-tube should not communicate any heat to the fluid. This was one object to be attained in the burners required for the use of the new illuminator. Another was some contrivance for concentrating a current of air upon the flame itself so as to consume as perfectly as possible all the rapidly escaping volatile gases, both as a saving of light and as a preventive of the disagreeable odors which they would otherwise diffuse.

Two well-known burners are conceded to have been in use before Reichmann's invention, which have a material bearing on his claims—the Vienna burner and Stuber's burner. These have been exhibited to us. The Vienna burner contained the flat wick-tube, the ratchet wheel attached thereto (but covered and not exposed as in Reichmann's), and a slotted dome above the wick for the flame to pass through, and a chimney. But the dome was not supported by slender arms, as in Reichmann's, but was connected with a gallery which supported the chimney and surrounded the wick-tube and dome, and rested on the lamp or cap below, so that all the light of the flame below the dome was inclosed and lost, and could not issue out, as in Reichmann's burner. The Stuber burner, invented by John Stuber in 1856, and made in considerable quantities in that and the following years at Utica, New York, was an improvement on the Vienna burner in this, that the gallery was so low as to leave a considerable open space under the dome for the reflected light to pass out in a downward direction, and the dome was supported by slender arms; but these arms were attached to the gallery and not to a sleeve fitted on to the wick-tube. It differed, therefore, from Reichmann's in these respects:

The chimney was supported on a low gallery instead of the dome itself, and the dome was supported by arms attached to this gallery, instead of arms attached to a sleeve on the wick-tube. Therefore, with these burners before us, all the invention we can discover in Reichmann's burner is the peculiar mode of supporting his dome by slender arms attached to a sleeve fitted on to to the wick-tube, and the elevation of the chimney on the outer edge of the dome. The latter peculiarity, as we have seen, is a defect which rendered the burner nearly useless.

We are constrained to hold, therefore that the Comet burner is not an infringement of Reichmann's original patent or of the invention which is exhibited in his original specification.

It is proper next to inquire as to the bearing of the reissue patent on the question in litigation between the parties. The defenses made by the defendant against this reissue are, first, that it was obtained illegally, wrongfully, and by false pretenses, and because it seeks to claim things of which Reichmann was not the original and first inventor. Secondly, that the original patent itself was void because the only thing in it which Reichmann had any pretense of inventing was anticipated by a man of the name of Michael H. Collins as early as 1843.

The specification of the reissued patent describes the burner of Reichmann substantially as was done in the original patent, being interspersed, however with observations as to the uses and objects of particular parts, evidently borrowed from subsequent experience and events. The single claim of the original patent is expanded into seven distinct claims.

If they mean anything more than the claim in the original patent, they are void. Being identical with that, they are needlessly multiplied, and by exhibiting a seeming of claims to which Reichmann was not entitled, they are calculated to confuse and mislead. We think it proper to reiterate our disapprobation of these ingenious attempts to expand a simple invention of a distinct device into an all-embracing claim, calculated by its wide generalizations and ambiguous language to discourage further invention in the same department of industry and to cover antecedent inventions. Without deciding that a repetition of substantially the same claim in different words will vitiate a patent, we hold that, where a specification, by ambiguity and a needless multiplication of nebulous claims, is calculated to deceive and mislead the public, the patent is void.

Our conclusion, therefore, is that the Comet burner is no infringement of Reichmann's reissed patent so far as that patent is valid.

Decree affirmed.

J. H. Latrobe and B. R. Curtis for appellants.

C. F. Blake and C. M. Keller for appellee.

The New Croton Main.

The work on the new mains which are to supply the lower part of the city with a welcome abundance of water is rapidly drawing to its completion. The thirty-six inch pipe which is to establish the direct line from Forty-second street to City Hall is laid to the corner of Duane street, and its connection with the Chambers street main is hurrying forward. This pipe is laid to connect with the upper line at the junction of Third and Fourth avenues, and a vault is building at that point to give access to the stop-cock, by which the connection is to be made, the work getting on night and day, Sundays included.

The Chambers street pipe, which is to intersect all the main pipes that have hitherto supplied the lower part of the city, is twenty-four inches in diameter, and when its junction with the direct line from the reservoir is made, will afford throughout the whole southern district a strong head of water. Chief Engineer Tracy makes no statement as to the day upon which the whole work will be completed and the water turned on. The new pipes are yet to be tested, and faults may be discovered which will occasion further delay. A report that the pipes were to be filled on Christmas day he contradicted. The head of water expected is so great, that some day must be selected when the down-town offices are occupied, lest they be flooded by the sudden influx of water. The filling of the pipes being completed, Chief Tracy proposes to throw a very unusually large and strong stream from a hydrant fed by the new pipes.—*N. Y. Times.*

On the Use of Compressed Air.

The following is an extract reprinted from an article in the *Journal of the Franklin Institute*, by D. M. Stauffer, C. E., on the use of compressed air in bridge-building:

The effect of the compressed air upon the men is nearly always severe the first time they encounter it, but a little experience generally removes all unpleasant sensations. The greatest actual pain felt arises from the abnormal pressure upon the drum of the ear. The tubes extending from the back of the mouth to the bony cavities over which the membrane is stretched, are so very minute that compressed air cannot pass through them with a rapidity sufficient to keep up the equilibrium of pressure on both sides of the drum, for which purpose the tubes were designed by

nature; the excess of pressure on the outside causes the pain. These tubes can be distended and the pain relieved, by the act of swallowing, or by closing the nostrils with the thumb and forefinger, shutting the lips tightly and inflating the cheeks. Either action facilitates the passage of the air through the before mentioned tubes, and establishes the equilibrium desired; but the relief is only momentary, and the act must be repeated from time to time, as the pressure in the air-lock increases. The pain is only felt while the air in the "lock" is being "equalized" or compressed. When the lungs and the whole system are filled thoroughly with the denser air the pain passes away, and the general effect is rather bracing and exhilarating than otherwise. You breathe freer, your lungs are expanded, and the whole system seems capable of extra exertion. From the excess of oxygen breathed, you are, in fact, living a physically "fast life;" but the novice, like the "fast liver" of the world at large, often pays rather dearly for his momentary strength; for, on getting outside a reaction sets in, with a general feeling of prostration, lasting, in my own case, at least nearly a whole day after the first two or three encounters with the compressed air. The laborers, by daily experience, soon overcome this feeling, and in the majority of cases feel no bad results, either while at work or afterwards.

The extreme limit or greatest depth at which men can labor, without material injury to themselves, has not yet been reached in works of this nature. Captain Eads, in the process of founding the piers of the St. Louis bridge, has sunk his caissons considerably over one thousand feet below the surface of the Mississippi—a depth never before attained—and yet by shortening the horus of labor from four hours to one hour, as the pressure increased, little trouble was experienced by the men. Even delicate ladies, according to the Official Report of Captain Eads, remained in the caisson nearly an hour, without feeling any marked ill effects from the extreme pressure. Out of the 350 men who, at different times, performed duty in the air-chamber at St. Louis, 35 were seriously affected by this unnatural pressure. Of these, twelve died; but the verdict of skilful physicians gave, in more than half the cases of death, totally different causes, though admitting that the effect of the compressed air was the exciting cause. Persons of weak lungs or of intemperate habits have no business there; and even a severe cold in the head, by stopping the eustachian tubes with mucus, will make it impossible to relieve the pain in the membrane of the ear while passing through the air-lock. In such a case there is danger of rupture to the drum of the ear, and the party should be let out immediately.

Owing to the excess of oxygen in the atmosphere of the column, combustion is, of course, more rapid than in air of the normal pressure; a candle is consumed in one-half the time inside, but burning with a flame nearly twice as high gives more light, and a less number is necessary for illuminating purposes. Fire must be carefully guarded against, as even the woolen clothing of the men is no safeguard—it will burn furiously when once ignited. Fire will, too, in this atmosphere, penetrate the most minute crevices. In one of the columns of the South street (Philadelphia) bridge the luting of red lead between the sections, was accidentally ignited, and though the exposed area was exceedingly small, it burned out that combustible material completely, nearly suffocating the workmen with the fumes of the paint. The excessive amount of smoke thrown off by the burning candles is another source of annoyance. The particles of unconsumed carbon float in the atmosphere, and are breathed by the men, coating the nostrils with its sooty deposit. In larger works of this nature, where roomy caissons are used, other methods of lighting are feasible. At the East River Bridge ordinary burning gas was employed with good effect.

[The statement in the last paragraph about the greater rapidity of the burning of candles in compressed air is not in accordance with known facts, and has been denied, on authority, in this special case. The candles burned slower.—Ed.]

Reduction in the Price of Gas in Albany.—Since the organization of a new gas company at Albany, the old company offers to supply gas to consumers on the line of the new company's pipes at a reduction of $1 per thousand feet.

Coking Under Pressure.

By John A. Church, of New York.

[Read to the American Institute of Mining Engineers at Pittsburgh.]

The following paper has seemed to us to be of ample interest to our practical readers, to justify transferring to our columns in full, from those of the *Engineering and Mining Journal*, of which Mr. Church, the author, is co-editor with Commissioner Raymond. —Editor.

At the last meeting of the Institute, a discussion arose upon the question. Is there pressure in Coke ovens? and many of the members seemed to think that the superiority of the Belgian furnace might be due to the fact that it is a completely closed chamber in which the gases given off by the coal are, or may be, at more than the atmospheric pressure. It seems to me that this position is untenable, and that an examination of one of these ovens in operation will show, not only that there is no excess of pressure in the coke chamber, but that the contrary is true, and a partial vacuum exists.

The Belgian or François oven consists of a rectangular chamber, closed at the ends by sliding doors, and furnished with flues in the side walls and floor. The new charge is introduced at a time when the furnace is so hot as to cause immediate and copious discharge of the volatile constituents of the coal. The gases pass downwards through the side flues, giving out their heat to the walls and thus to the coal. Underneath the floor air is introduced and the gases burn, producing intense heat. Heat is also reflected from the arched roof upon the coal, which is therefore heated from all sides. The especial advantage which this construction was designed to secure is that no air is admitted to the coke chamber. All the heat is produced by the combustion of the uncokeable gases and the yield ought to be a *maximum*. It is so in fact, allowing for the imperfections inseparable from furnace construction and management. Sometimes the yield is in excess of the percentage indicated by assay, showing that the operations in the large way are more thorough than in assays performed upon comparatively minute quantities.

The sliding doors of course form no perfect joints, and to prevent the access of air the crevice around the door is closed by a clay luting. Except when the clay is of unusual excellence the luting cracks and sometimes scales off in places. It is evident that if there is excess of pressure in the furnace the gas will issue from these crevices, however minute, and will burn when it meets the air. With a pressure in the coke chamber we ought to see the oven doors fringed with small flames.

On the other hand, if there is a partial vacuum in the chamber the air will enter, the gases will burn, and there will be flames within the furnace. The coke will also burn and will leave proof of its combustion in the form of ashes.

Which of these conditions does observation point to as the one really existing? Evidently the latter. No flames appear around the door, but when the coke is drawn out the ends of the mass are found to be covered with ashes—proof conclusive of the entrance of air, and the existence of a lower pressure within the furnace than without. I have seen ovens luted with a short clay that cracked easily, and required frequent renewal during the operation. In these there was an amount of ash which indicated a serious loss of coke, and whoever has the management of coke ovens will find that the selection of a proper clay for luting is well worth his attention.

These circumstances seem to me to sufficiently disprove the supposition of those who look to pressure of gas as a cause of the excellence of the coke from the Belgian oven. It is possible, however, that pressure does exist for a short time after the furnace has recovered from the temperature lost upon the first admission of the moist and cold charge, and while the coal is still rich in hydrocarbons. It is possible that for a short time the evolution of gas is greater than the capacity of the flues to carry off, but this cannot last very long, nor be very marked, and it is doubtful if it has any effect whatever upon the formation of the coke. I am the more inclined to this opinion for the reason that progress in the construction of coke ovens has not taken the direction of increasing or maintaining this pressure if it exists. It does not appear that any attention has been paid to it. Dating from the time when the great step of excluding the air from the coking chamber was taken, improvement has followed two lines. They are:

1. To increase the height of the bed of coal.
2. To increase the temperature at which it is coked.

Recent changes illustrate the character of this improvement in a striking manner. Instead of broad and low chambers, narrow and high ones have been built. Formerly the coal lay in a thin horizontal layer; now it is a thin vertical layer. The thickness of the interior walls, which transmit the heat to the coal, has been lessened nearly 60 per cent. in one instance. The time of coking has been reduced to 24 and 36 hours. Twenty-four hours is a length of time which seems to meet with general favor, both from the convenience of management, and also from its effect upon the result.

A greater pressure, due to height of the mass, and therefore a denser coke, has been the result of the change in form; while a higher heat is obtained from the use of thinner walls, and from making the charge while the furnace is still at the high temperature produced by the combustion of rich gases. Both causes permit the use of a poorer coal, whether its poverty results from the presence of ash, or from lack of volatile constituents.

The Belgian oven produces a coke that seems to be about as near perfection as we can expect to obtain. It is large in fracture, finely gray in color, firm and ringing. It contains a minimum of volatile matter, and, strange to say, the very thoroughness of the coking process in this furnace has caused its rejection in at least one instance. Mr. I. Lowthian Bell mentions that his firm returned to the old form of oven—probably the Beehive—after trying the Belgian. The reason was, that the latter furnace made too hard a coke, and more fuel was necessary in the blast furnace. Mr. Bell's view of the case seems to be that the hard coke resisted solution by the carbonic acid formed lower down in the furnace. This produced a lack of carbonic oxide, which is necessary for the deoxidation of the ore. Thus the train of operations upon which iron-making depends was interrupted. But these effects are, of course, dependent upon the furnace and charge employed. It is very possible that the change from a soft to a very hard coke will throw the usual run of a furnace into disorder, but this is nothing against the positive value of hard coke, which certainly cannot be more difficult to handle than anthracite coal.

The gradual improvement of coking processes has enabled us to increase the thickness of the coal in the oven from eighteen inches to four feet, or a little less.

The building of 100 new ovens in a Westphalian establishment, side by side with those which have been in use for years, enables us to observe the changes that experience dictates. We find that for the same charge of coal the length of the furnace remains unchanged, while the width has been reduced 45 per cent., the thickness of the interior walls 54 per cent. and the time of treatment from 25 to 33 per cent. The only dimension that has been increased is height, 30 per cent. having been added to the height of the chamber, and 88 per cent. to that of the coal. The dimensions of the two setts of furnaces are:

	Old ovens.	New ovens.
Length	22 feet	22 feet.
Width	2 ft. 7 in,	1 ft. 4¾ in.
Height	5 feet	6 ft. 6 in.
Charges	4 tons	4 tons.
Time	36—48 hours	24—36 hours.
Surface of floor	57 sq. ft.	36 sq. ft.
Thickness of inner walls	29 inches	13½ inches.
Yield	65—72 per ct.	

The object of these changes was not to increase the yiled; that was already satisfactory. But it was desired to use a drier coal, or a mixture which would not produce a good coke in the old furnaces.

Having glanced at the changes whirh have met with approval, it is worth while to mention those which did not prove to be entirely advantageous. We find that in the early days of the Belgian oven it was some-

times made as much as two meters, or nearly seven feet high, and also that very large ovens were built, to take a charge of as much as seven or nine tons. Neither of these forms has met with entire approval. A bed of coal forty to fifty inches in thickness has been found to give sufficient solidity to the coke, and the use of thinner walls with a moderate height of chamber permits a sufficiently large product from a given area of ground. Thus 100 ovens of the dimensions given above will cover, old style, about 11,000 square feet, and new style about 5,500 square feet, or just one-half. The average time of coking was in the old ovens 42 hours; the charge four tons; and the product from 11,000 square feet in twenty-four hours was therefore the coke from about 230 tons of coal. By the new method of construction, the charge being the same, and the time thirty hours on an average, the product from 11,000 square feet will be the coke from 620 tons of coal, or nearly three times as much. Inasmuch as the very large furnaces take an exceptionally long time to do their work, it is plain that the smaller ones fully equal them in the amount of their product.

Purifying Gas.

LETTERS PATENT TO ROBERT HOGARTH PATTERSON, OF HAMMERSMITH, IN THE COUNTY OF MIDDLESEX, GENTLEMAN, FOR THE INVENTION OF "IMPROVEMENTS IN THE PURIFICATION OF COAL GAS."

Sealed 28th May, 1872, *and dated 9th March*, 1872.

Provisional specification left by the said Robert Hogarth Patterson at the office of the Commissioners of Patents, with his petition, on the 9th of March, 1872.

I, Robert Hogarth Patterson, of Hammersmith, in the county of Middlesex, gentleman, do hereby declare the nature of my said invention for "Improvements in the Purification of Coal Gas," to be as follows:

This invention relates to the purification of coal gas from sulphur in other forms than sulphuretted hydrogen by means of sulphide of calcium, while the carbonic acid is likewise reduced, with a corresponding improvement in the illuminating power of the gas. Also the lime on being emptied from the purifiers, having been mainly converted into carbonate, is much freer from offensive odor than lime as ordinarily used.

It is proposed to use this process in the following ways, which may be employed either together or separately.

1. A purifier (or purifiers) is used containing pure sulphide of calcium, into which the gas is passed after being purified from sulphuretted hydrogen and carbonic acid. Thereafter a second purifier is used containing fresh lime which is gradually converted into sulphide of calcium by the overflow of sulphur compounds from the first purifier.

2. At present the action of lime purifiers is greatly impaired and sometimes wholly destroyed owing to the carbonic acid in the gas, whereby the lime is converted into carbonate of lime which does not absorb sulphur in any form. Accordingly I propose to eliminate carbonic acid from the gas in such manner that one or more of the said purifiers shall contain lime as nearly as may be in the form of sulphide of calcium.

One mode of applying this principle is by passing the gas through the first purifier (or purifiers) of the series for such time that the carbonic acid shall (from its greater affinity for lime) have expelled the sulphuretted hydroged from the vessel, taking its place and driving it (viz., the sulphuretted hydrogen) forward into the succeeding purifiers. By this means the largest possible amount of carbonic acid will be absorbed by the first purifier or purifiers, while the sulphuretted hydrogen being thus driven forward converts the contents of the subsequent purifiers into sulphide of calcium. The contents of the first purifier being now mainly carbonate of lime are when emptied comparatively free from the offensive odor of ordinary gas lime.

Another method (which may be used in conjunction with either of the above-described processes) is to make the gas pass through or otherwise come in contact with a solution of soda or of potash, or of ammonia, before entering the purifiers, in order to reduce the amount of carbonic acid.

I also propose as an improvement in the purification of gas from sulphur in other forms than sulphuretted hydrogen, to make the gas pass through or otherwise come in contact with a solution of soda or of potash, or of ammonia, after all the other purifying processes (whether by lime, by oxide of iron, or otherwise) with a view to absorb the sulphur in the gas in other forms than sulphuretted hydrogen, after the gas has been purified from sulphuretted hydrogen and carbonic acid.

I also propose to attain the same object (viz., the purification of gas from sulphur, in other forms than sulphuretted hydrogen) by means of pure sulphur, used either by itself or mixed with lime, soda, or ammonia, these substances being used either in solid or in solution.

Specification in pursuance of the conditions of the letters patent filed by the said Robert Hogarth Patterson in the Great Seal Patent Office on the 9th September, 1872.

To all to whom these presents shall come, I, Robert Hogarth Patterson, of Hammersmith, in the County of Middlesex, Gentleman, send greeting.

Whereas Her most Excellent Majesty Queen Victoria, by Her letters patent, bearing date the ninth day of March, in the year of our Lord one thousand eight hundred and seventy-two, in the 35th year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Robert Hogarth Patterson, Her special license that I, the said Robert Hogarth Patterson, my executors, administrators, and assigns, or such others as I, the said Robert Hogarth Patterson, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "Improvements in the Purification of Coal Gas," upon the condition (amongst others) that I, the said Robert Hogarth Patterson, my executors, or administrators, by an instrument in writing under my hand and seal, should particularly describe and ascertain the nature of the said invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said letters patent.

Now know ye, that I, the said Robert Hogarth Patterson, do hereby declare the nature of my said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement.

This invention relates to the purification of coal gas from sulphur in other forms than that of sulphuretted hydrogen by means of sulphides of calcium (as distinct from the material called "gas lime" or "foul lime," which may be, and under the existing methods of working lime purifiers is always partly carbonate of lime) employed in separate purifiers.

It also relates to a principle and process of working lime purifiers, whereby the carbonic acid in the gas is elimininated by the action of the first purifier or purifiers of the series in such a manner that the lime in the subseqnent purifiers is converted either wholly or to any extent that may be desired into sulphides of calcium.

It also relates to the use of washers or scrubbers containing a solution of caustic soda, or of potash, or of ammonia, by the employment of which vessels the carbonic acid is eliminated from the gas in such manner that when the said washers or scrubbers are placed before ordinary lime purifiers, the contents of these purifiers can be converted into sulphides of calcium, and thereafter maintained in that form; and when the said washers or scrubbers are placed before purifying vessels containing sulphides of calcium or sulphides of sodium, the contents of those vessels can be maintained in the form of sulphides.

It also relates to the purification of coal gas from sulphur existing in other forms than that of sulphuretted hydrogen by means of washers or scrubbers containing a solution of caustic soda or of potash, through which vessels the gas is passed after it has been purified from sulphuretted hydrogen and carbonic acid.

It also relates to the purification of coal gas from sulphur, existing in other forms than that of sulphuretted hydrogen, by means of sulphur in a fine state of division, and in conjunction with an inert substance, or in combination with soda or with lime, or with lime and soda together in solution or otherwise.

I propose to employ these processes as follows:

I. Sulphide of Calcium Purifiers.—A purifier (or purifiers) is used containing pure sulphides of calcium, into which the gas is passed after being purified from sulphuretted hydrogen and carbonic acid for the purpose of absorbing the sulpho-carbons, i. e., the sulphur in other forms than sulphuretted hydrogen. A second purifier should be used containing fresh lime or oxide of iron to arrest any sulphur compounds passing forward from the previous vessel containing the sulphides of calcium. When the first purifier has become saturated to such an extent as to be no longer capable of efficiently absorbing the sulpho-carbons it is to be charged anew with fresh sulphide of calcium.

It is not indispensable that the whole of the carbonic acid or of the sulphuretted hydrogen shall be eliminated from the gas before it enters these sulphide of calcium purifiers, but the less carbonic acid and sulphuretted hydrogen enters the said purifiers the longer will their contents remain in an efficient condition for purifying the gas from sulphur in other forms than sulphuretted hydrogen, When the gas (by processes described in this specification or otherwise) has previously been completely purified from carbonic acid and from sulphuretted hydrogen the contents of the sulphide of calcium purifiers will remain efficient for a long time, seeing that the only "fouling" element which enters is the small amount of sulphur which exists in the gas in other forms than sulphuretted hydrogen. If any carbonic acid or sulphuretted hydrogen enters the said purifiers the fresh lime in the subsequent purifier will quickly be converted into sulphide of calcium by an overflow of sulphur compounds expelled from the anterior purifiers by the carbonic acid.

This process may be advantageously employed in addition and subsequent to the purifying processes, by oxide of iron or otherwise, at present used in gas works.

[To be continued.]

A New Way to Light Gas.

A new method of lighting gas has been invented by Mr. J. Billington Booth, of Preston. By this method street lamps can be lighted simultaneously from any distance. The apparatus constituting the invention, the Preston *Chronicle* tells us, looks like a moderately sized globular inkstand of glass, surmounted by a tube of the same material, with a metallic top; by screwing off the burner it can be very easily attached to any lamp, chandelier-pipe, or ordinary gas-jet. The base or globular portion is well filled with a deep red-colored liquid, so cheap that three pennyworth will serve the lamp for a year. Over the liquid and within the glass tube there is a plate of zinc, with a piece of graphite or gas coal, and between these and a thin coiled platinum wire, fixed over the cup of the general vessel, into which a gas-burner is inserted, galvanic communication is obtained. Ignition is thus effected:

A pipe is screwed to the top of the gas pipe; pressure on the gas in this pipe causes a simultaneous depression upon the chemical solution which occupies a lower level in two side tubes; the gas occupies the vacuum caused by the displaced liquid, and then ascends to a chamber connected with the burner, while the displaced liquid is pressed into two side tubes effecting contact with the zinc and graphite, and generating galvanic activity. This is communicated to the platinum wire, and excites its catalytic power; the wire being then exposed to the ascending jet of gas, immediate ignition takes place.

The above seems to be nothing but a British piracy of Klinkerfue's method, which we have repeatedly referred to.

The City and the Gas Company.

As there has been, of late, considerable criticism of the gas company, and its charges to our citizens, which has, we are glad to say, resulted in a reduction in the price of gas of 50 cents per 1,000 feet to private consumers; and as the city in its corporate capacity by far the largest consumer of gas, we present the following facts and figures, as to the relation between the city and the company, together with certain suggestions as to greater economy in the lighting of the streets:

There are now erected and in use in this city 748 street lamps. Of these 235 burn all night and 513 until one o'clock A. M. The city pays for these lamps, for such as burn all night, $52, and for such as burn till one o'clock, $42 a year. This gives the following cost per annum.

For 235 lamps at $52	$12,220
" 531 " " 42	21,546
Total	$33,766

This cost includes lighting, extinguishing, and cleaning the lamps. Under a former agreement with the gas company, in which charges for gas and for lighting, extinguishing and cleaning the lamps, were separated, the charge for the latter, when the lamps were burned all night, was $8, and where burnt until one o'clock, $7 a year. Now, to ascertain the price paid by the city per 1,000 feet of gas. we deduct these amounts from the $52 and $42, and we have $44 $44 and $35 respectively. The lamps burn four feet per hour each; the all-night lamps are lit an average of 11 hours, and those extinguished at one o'clock A. M., six hours. An all-night lamp, then, burns 44 feet per night, or 16,060 feet per year; this at $44 is, almost exactly, $2.75 per 1000 feet. The lamps, extinguished at one o'clock, burn 24 feet a night, or 8,760 feet a year: this at $35 is very nearly $3.40 per 1000 feet. We burn 513 lamps till one o'clock and 235 all night. By making the proper calculation it will be seen that the average paid for gas for all the lamps is, as nearly as may be, $3 per 1000 feet.

It may, we think. be considered that this charge is not excessive. It must he borne in mind that our city is scattered over a Large district, and that gas producers cannot afford their product, under such circumstances as at low a rate as where cities are closely built and consumers very numerous, The percentage of cost of pipes, etc., to consumption is far greater in the one case than in the other.—*Elizabeth Journal.*

Warren's Patent Cooker.

About two hundred years ago (Paris, 1682) Denis Papin, a physicist of little contemporaneous fame, but subsequently of great renown, published an account of an apparatus he had invented "for cooking all sorts of viands in a short time, and at a trifling expense." This contrivance is known among scientific men as "Papin's Digester." It has long been employed in physical researches, and by the pharmacist and chemist, in the preparation of various compounds, but its introduction for culinary purposes has been very limited. The principle upon which it worked was not any better understood than was the steam engine and steamboat on the Fulda, invented by the same Papin, and, although Fulton and Watt have have helped us to the latter, no one has taken up the former until very recently. The digester is a capital invention, and, even when known as "the Cooker," it will bear all the examination and criticism that unbelievers may bestow upon it. I do not mean to intimate that the Warren Cooker is an exact copy of the digester of Papin, but it will not hurt its chances of success before the community to say, that the principle upon which the modern cooker is based, was enunciated and settled two hundred years ago, and it is hardly worth while to waste much time in praising it. Capt. F. P. Warren, of the English navy, is said to have produced a complete revolution in the system of cooking meat and vegetables hitherto practiced in England. According to the reports or many travelers in Great Britain, the revolution does not come too soon, and the historian must regret that Papin did not obtain a more cordial reception when he was in London two hundred years ago, a fugitive from religious persecution, and an exile from his adopted German home. He might have saved the English from many a fit of indigestion, by persuading them to cook their food in a philosophical manner.

The Warren Cooker is a copper-bottomed tin boiler, into which is tightly fitted an inner vessel not quite so deep. The outer vessel has an inch or so of water poured into it; the inner boiler is then attached. The inner vessel has a false bottom, on which is laid the meat to be cooked. Upon the application of heat the shallow layer of water is brought to a boil and the steam passes up to a chamber fitted on the top, in which vegetables may be placed. No steam comes in contact with the meat; it simply surrounds the vessel containing it, and cooks it at a temperature somewhat under 212° F. The juices of the meat are all saved, as there is no aperture for their escape, and the loss in the weight of the meat is trifling as compared with the old method. The heat is sufficient to coagulate the coloring-matter of the blood as well as the albumen of the juices, and yet is inadequate to char or in any way burn the meat. The vegetables in the upper vessels are steamed and made tender, instead of stringy and tough. The steam from them is not lost, but is condensed and returned to be used any number of times. As the heat employed is less than that of boiling water, the cost of fuel is materially reduced, and after the cooking is finished the food can be kept warm for an hour or more. If the cooker were to be fitted into a Norwegian felted box, I see no reason why the contents of the vessel could not be kept warm for five or six hours. There is a safety tube, out of which escapes a small puff of steam. Too rapid boiling must be avoided, and this is easily determined by the violence of the escaping steam.

The principle upon which the Warren Cooker is based is applied in so many chemical processes, that it seems strange that we should have gone without it in common life for so many years. It has long worked well in the laboratory; it is now time to give it a fair trial in the kitchen.—*Prof. Joy.*

The Gas Question and Pavements.

Commissioner Van Nort recently sent to the Common Council a long communication in relation to the cost of gas for the public lamps, and the practicability of gradually replacing the wooden pavements in the city by stone pavements. Mr. Van Nort recommends early legislation in regard to gas and pavements, and says that no plan yet submitted for remedying the difficulties complained of, in regard to the gas supply, is satisfactory. He suggests that the Legislature be asked to enact a law providing that all gas manufacturing companies be required to furnish the supply needed for public street lamps, and for city and county offices, at a cost not exceeding — per cent. over and above the actual cost to such companies of the lighting, extinguishing, cleaning, and supply of gas for such purposes, and that each municipality be authorized to appoint or designate some proper person to ascertain and determine the quantity of gas furnished monthly to it, and to compute the rate at which the same shall be paid for.

THE WOODEN PAVEMENTS.

On the subject of the maintenance of pavements, and the decision as to the proper methods of paving, Mr. Van Nort says that the wooden pavements in this city have so far all proved very expensive to lay and maintain, and he considers it doubtful if any form or preparation of wood can be made and maintained except at great cost, as the same organic difficulty exists with all kinds—namely, speedy decomposition.—*New York Herald.*

GOOD NEWS FOR THE BLOOMFIELD GAS COMPANY.—It is said that the Bloomfield Gas Company have just put down well No. 2 by the side of the old one, and the flow of gas is stronger than from the old well. They have also an engine pump at work to force the gas from the well to the city, and propose to have two more along the line of the pipe to assist. The Bloomfield Gas Company now furnishes 200,000 feet of gas per day to the Rochester Gas Light Company at $2 per 1000, and the city of Rochester being on a lower level than the bottom of the gas wells, it becomes necessary to use these force pumps to drive the gas to the city in sufficient quantities.—*Dansville Advertiser.*

Utilization of Differential Expansion.

A correspondent of the *Scientific American* at Yonkers, communicates the following remarks, which have interest. It is scarcely necessary for us to say that the form of thermometer spoken of in his last paragraph is that so familiarly known to scientists as Breguet's.

A description of a fire alarm was published two or three years ago, taken from *L'Union Medicale*, a French journal; is described an arrangement, contrived by Mr. Robert Houdin, which consisted of steel and copper blades, soldered together and fixed on a board, like a knife blade standing with its edge or back up, only touching the board at one end of the blade, where it was fastened and connected with one pole of an electric battery; the other end was near a button connected with the other pole of the battery. Owing to the unequal expansion of the metals, when heat was applied the strip would bend and touch the button, and a bell connected with the battery would ring as long as contact continued.

About the time of said publication, a fire-detector was for sale at 80 Cedar street, New York. I do not remember the name of the proprietor of it, but it was dependent on the same principle as Mr. Houdin's invention; but instead of being connected with the bell by electricity, it acted like a hair trigger, releasing a spring which was connected by a wire with a bell rung by mechanism; this alarm could be set to ring at any degree of heat, even by breathing upon it, which I saw done. Copper and iron were the materials used, I thought this an excellent safeguard, and one that no house should be without. It should be placed in the basement, where a fire may make such progress at night as to cut off the retreat of the family above, before they were awakened by it; but I have since heard no more of the device.

Having one of Holmes' burglar alarms in my house, I was desirous of having a fire alarm connected with it, and finding by Molesworth's tables that expansibility of zinc over iron was nearly three times greater than copper, I soldered a ribbon of tin and of zinc together; I made it fourteen inches long, and rolled it in a spiral form. One end was fixed in my basement, and one of the battery wires connected with it; the other end was free, and near to it the end of a wire, attached to the other battery wire. I have thus a very good fire alarm, large quantities of which might be made to cost not over two or three cents each.

I have read of a plan of distributing, throughout a store or factory, water pipes, perforated with many holes, so that the whole building or sections of it might be sprinkled in case of fire; I wish to suggest that, by using the Cedar street trigger arrangement, only the part where the fire was, need be sprinkled. The supply pipe should run the whole length of the building or ceiling, with pipes leading from it across the room at moderate distances from each other, and each of them should be supplied with a detector or alarm, to let the water into the one that had unusual heat under it, and at the same time ring a bell; but as all machinery is liable to get out of order, a night watch should not be dispensed with.

I do not know how long the use of the principle of the unequal expansion of metals, to show heat, has been known; but thirty or forty years ago, Mr. Baure, a very skillful watchmaker in William street, near Maiden lane, New York city, showed me a thermometer which he had made, inclosed in a watch case, in which the degrees of beat were indicated by a hand moved by a small spiral ribbon of two metals, which he had soldered together.

THE WATER METER QUESTION.—Commissioner Van Nort has been served with a mandamus from the Supreme Court to pay Jose F. Navarro, the patentee of a water meter, $283,500, and interest from September 17, 1871, for water meters supplied to the city. The Commissioner has consulted with the Corporation Counsel, who has advised the making out of the requisition on the Comptroller.—*Herald, Jan. 7.*

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

Gas Meters—A Good Suggestion.

Knoxville, Tenn., December 31, 1872.

Mr. Editor: I read with much interest, your editorial on the "Economical Use of Gas," which appeared in your issue of December 16th. You say, in speaking of the meter, "Its mode of operation is a complete mystery to the consumer; and many of them could as readily translate a passage in the Sanscrit, as to intelligibly read the index dials, and ascertain the amount of gas registered." I believe the reason of such ignorance, in a large majority of cases is, that the consumer seldom or ever sees the meter. How often is it placed in the darkest and most inaccessible corner of the house? How often has the inspector, light in hand, to stumble over the accumulated rubbish of years to see the index? And how can it be expected that the consumer will take the trouble to watch the operation of the meter, or note the registration in such a situation.

Architects are, in my opinion, much to blame in this particular. Although gas has become quite a necessity in a house, yet how seldom do they make a proper provision for the gas meter, and yet how easily it could be done. Let them ascertain the number of burners required, then they can get the size of the meter, which ought to be placed in a neat recess prepared for it, say in the main hall or entrance. This recess could be covered with a glass door, which could be highly ornamented according to taste; the lid of the index box could be left open, and the consumer could see, if he liked, every morning, the amount of gas burned during the night, for with a little practice, he could learn to read the index as easily as he could the time of day. For a number of years I have succeeded in getting this recess in nearly all the new houses, with good results. The consumer is brought in daily contact with the meter, and he can, without any inconvenience, observe its operation. But yet with all this it is remarkable to note the ignorance of the general public on the subject of gas. Most men of ordinary intelligence understand well the principle and working of a steam engine, but the principle and working of the gas meter, although it affects them more closely, is to them an unfathomable mystery. I have some very worthy customers who will gravely persist in calling it the "meteor." No doubt they think it somewhat akin to those transitory bodies; an idea derived and fostered probably from the general verdict of "fastness" with which these ingenious and truthful pieces of mechanism seem to be endowed. The companies have everything to gain by a more general knowledge of gas and gas matters on the part of the consumer, therefore I am looking forward with much interest to the publication of your little book. Some such work as you promised is much needed. I trust it will soon be ready. I intend giving, if possible, a copy to every consumer. Respectfully,

James Somerville,
Sup't Knoxville Gas-Light Co.

Cooking with Gas.

Boston, December 27, 1872.

Mr. Editor: The remarks elicited by my communication to the Gas-Light Journal, under date of October 6th, calling attention to the importance of gas stoves with escape pipes for carrying off the products of combustion, seem to claim a few words in reply.

The gist of my communication referred to may be gathered from the following extract:

"Nothing can be annihilated. However perfectly the gas may be burned, there must always remain the products of combustion. The principal constituents of these products are vapor of water and carbonic acid gas. The character of the inferior constituents varies with that of the coal from which the gas is made, and also, with the manner in which the gas is burned, whether with more or less air, or whether free or in contact with some metal. Sometimes the most noxious vapors—the vapors of arsenic for example—have been detected in the products of combustion,"

In the Journal of the 2nd inst., the communication from which the foregoing passage is taken, is somewhat contemptuously referred to by your correspondent, Mr. Magnus Ohren; and it is also, in the same Journal, made the subject of some very pertinent editorial remarks, questioning whether there is any just ground for believing that arsenic enters into the composition of much, if any, of our American coal.

In Mr. Ohren's letter, however, I find nothing to reply to. He does not deny my postulate that "nothing can be annihilated"; nor does he try to show that the products of combustion of gas are innocuous; but says "that Leoni's heating stoves are used in the bedrooms and halls of families in Sydenham, who would not tolerate them for one moment, if they gave any unpleasant odor," and assures your correspondent that "if he will order one of Wright's porcelain cooking stoves he will find no smell, and no necessity for a chimney." Against mere assertions like that it would, of course, be in vain to array the facts of science, or the arguments to be drawn from them.

The exception which you, Mr. Editor, take to my communication, does not refer, as I understand you, to the general statement that the products of the combustion of gas are disagreeable and deleterious; and hardly to the particular statement that the vapors of arsenic have been detected in such products; but only to this latter statement, so far as it has respect to gas manufactured from American coal. The question involved is one about which I have no means of forming an opinion. I am much interested, however, to learn as to the result of your own scientific researches, that there is not much fear of arsenical fumes from American coal gas.

That I may not seem to have made statements without authority, I give below a quotation from an article on Heat, by James Wylde, Esq., to be found in *The Circle of the Sciences*, part 2, page 32:

"With respect to the employment of gas stoves, which have been lately introduced into such general use, it is impossible to speak too strongly in their condemnation. We of course refer to those from which the products of combustion, together with the heated air, are allowed to escape into the apartment. *All coal gas contains arsenic*, sulphur, ammonia, and other impurities. During the combustion of the gas these substances are diffused in a gaseous form; and being inhaled by the lungs are eventually absorbed in the blood. To speak of the substance most commonly present—arsenic—is sufficient to remind our readers that it is a deadly poison, and one from the use of which we almost instinctively shrink. There is, however, scarcely a room in the kingdom wherein gas is burned, and no means are employed to get rid of its products, that is not more or less a poison propagator; and by chemical tests arsenic may be easily detected in its gaseous form, floating in the air. There are thousands of our countrymen, probably, in our warehouses and shops, who are unconsciously yet daily inhaling gas, the effects of which, while manifest in the decay of health, are really ascribed to other but undue causes"

But whether or not arsenic exists in a vaporous form in the products of the combustion of American gas, there are other impurities which are sufficiently unwholesome and mischievous, such as carbonic acid gas, sulphuretted hydrogen, bisulphuret of carbon, etc. Dr. Letheby, in several of his reports to the Corporation of London, has shown that bisulphuret of carbon, in the act of burning and oxydizing, forms sulphuric acid, a great portion of which escapes in a corrosive form, and does enormous damage to every kind of textile fabric. He states that in almost every library in the kingdom where gas is used, the books are falling to pieces from the action of this acid upon the covers, and he makes reference to the libraries of the Athenaum Club House, the London Institution, and several other libraries, for examples of the mischief done. In more of these places the injury has been so great that a remedy has been called for, and Prof. Faraday invented an apparatus which has been found to obviate the evil. This consists in an arrangement of pipes for carrying off the products of combustion as soon as generated. The "Sun Burner," so called, the argand burner of Mr. Carter, and some others are constructed upon the same principle.

I cannot reasonably ask for more of your space, but nothing I think is more clearly demonstrable from the laws and facts of science than the danger to health and life, of burning gas in large quantities, as for calorific and cooking purposes, in close and unventilated rooms. Citizen.

Seeking Information.

Jefferson City, Mo., December 30, 1872.

Mr. Editor: Can ammonia be effectually removed from coal tar by means of *dry* condensation, without the use of any water in the entire process of manufacture. Yours truly, A Subscriber.

Terrific Gas Explosion.

At twenty minutes to 11 o'clock on Sunday evening 12th inst., a gas explosion occurred in the principal office of the Western Union Telegraph Company on Third street, Cincinnati, heaving up the floor of the receiving room between the desks and windows, destroying the ceiling of the delivery room in the basement, and blowing the plate-glass windows in a thousand fragments. The panelings of the doors were torn out and portions of the cast-iron mouldings forming the base of the column at the street door were hurled into the street, striking a messenger-boy on the leg, but inflicting only slight injury. The windows in the bank opposite were badly cracked About a dozen operators at work on the fourth floor rushed through the darkness to the street in safety, but subsequently returnod to work. There were five persons in the room where the explosion occurred, and they fortunately escaped uninjured.

Getting Diamonds.

A funny correspondent of the *World*. has been inspired by the late accounts of great diamond discoveries (!) to relate an almost equally possible and probable tale of a man named Charles John Williamson, of Greenbush, New York, who recently died of so novel a disease that a post mortem examination of his body was made by Drs. Wood B. Thayer and Israel E. Heare.

Several years prior to his death, Mr. Williamson had suffered from enormous aggregations of adipose matter, which accumulated in various portions of his body. About two years ago he began to grow lean, and finally wasted away almost to a shadow, this etietiepiperitribomenosis being unaccountably accompanied by swellings about the joints, upon which urate of soda was supposed to have been deposited, as is common in gout. Finally the man died in great agony, and the post-mortem examination showed that his joints were literally set with diamonds, deposited there by the unusual working of unassisted nature.

The theory of Drs. Heare and Thayer was that the accumulated fat, in wasting away, had left the pure carbon, in which adipose matter is so rich, on the joints, where, while Mr. Williamson had lain unable to move in bed, it had crystalized into the purest diamond. His relatives did not mourn as those who do so whom one leaves but an ordinary cadaver, The correspondent suggests that, as the human body is ultimately but carbonic acid, ammonia and water, cadavers should be adamantized by treating them first to a drying process to eliminate the water, then to an acid bath to neutralize the ammonia, and then hung up on a quiet nail to allow the carbon to crystallize.

Fall of a Building.—At noon yesterday (Nov. 29th), a brick building 125 feet long and 65 feet wide, situated in the rear of Court street, Cambridgeport, owned by the Cambridge Gas Company, and intended to be used as a retort house, suddenly fell with a crash, and in a moment became a mass of shapeless ruins.

[*For continuation see page* 28.]

THE AMERICAN

GAS-LIGHT JOURNAL

AND

Chemical Repertory,

PUBLISHED ON THE 2D AND 16TH OF EACH MONTH,

At No. 42 Pine Street, New York.

A. M. CALLENDER & CO.,
PROPRIETORS.

EDITOR—PROF. HENRY WURTZ.
Editor's Private Office, 26 Pine St., Room 36.

This is a recognized official organ of—
LIGHT, HEAT, MINING INTERESTS, STEAM, WATER-SUPPLY, PATENTED INVENTIONS, VENTILATION, SANITARY IMPOVEMENT, AND GENERAL CHEMICAL SCIENCE.

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Great Britain—TRUBNER & Co., 60 Paternoster Row, London.

☞ All communications to be addressed to "THE EDITOR, No. 42 Pine Street, Room 18, New York.

THURSDAY, JANUARY 16, 1873.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 11 and 121 Nassau street, New York agents for this Journal. News dealers will please send orders to them.

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TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

CONTENTS.

☞ An asterisk (*) denotes an illustrated article.

Champion Water Wheel Governor..... 19
Chemical Excerpts..... 20
Important to Patentees—Judge Bradley's Opinion of Reissues..... 21
The New Croton Mains..... 21
On the Use of Compressed Air..... 21
Coking Under Pressure..... 22
Purifying Gas..... 23
A New Way to Light Gas..... 23
The City and the Gas Company..... 23
Gas Question and Pavements..... 24
Utilization of Differential Expansion..... 24
CORRESPONDENCE.—
Gas Meters—A Good Suggestion..... 25
Cooking with Gas..... 25
Seeking Information..... 25
Getting Diamonds..... 18
Fall of a Building..... 25
EDITORIALS—
Save Your Gas by Using Regulators..... 26
The Vienna Exposition of 1873..... 26
The Pittsburgh Difficulties..... 27
The Centre Street Fire..... 27

SAVE YOUR GAS BY USING REGULATORS.

It is a known fact that gas as usually burned in dwellings, offices, and manufactories, costs more and gives less light if the pressure on the pipes is not properly controlled. A properly constructed gas regulator is therefore of great use, for if it be efficient and constructed on accurate principles, it registers the pressure and varies it so as to secure from the gas consumed the greatest illuminating power it is capable of giving. The usefulness of such an instrument may easily be tested.

There are many gas regulators in the market, and their power of properly controlling the consumption of gas has been duly certified. Our purpose now, however, is not to call attention to any particular form of this instrument, but simply to notice the principles of its action, and its agency in checking an undue pressure in the premises of the consumer.

Although various modifications of the regulator have been devised and patented, their principle of operation is essentially the same, viz., to offer a certain amount of obstruction to the flow of gas, or to regulate it in such a manner as to maintain an equable pressure in all parts of the building. This is effected by the gas which enters the service-pipe of the consumer, exerting a pressure on the movable part of the apparatus, which contracts the passage for the admission of the gas, when the pressure exceeds the desired amount, and thus its flow is rendered uniform. The movable part of this regulator is usually either a small gas-holder sealed with mercury or a flexible diaphragm, to which a valve is attached. The pressure of the gas when greater than is desired to be used, raises the valve and diminishes the size of the opening for the gas, and thus a uniformity is attained, the result of which is a far pleasanter and more steady light, as well as the no less important desideratum—a reduced bill.

The high pressure in the main-pipes, if allowed to go unchecked to the burner tips will cause the consumption of a much larger quantity of gas than otherwise, even if it is regulated in the burners themselves. The proper place to regulate it is at the main valve near the meter, which should be shut off until the burners are just right, with the cocks open full. By this means all your burners will be uniform, and the light will be as good with two-thirds of the main-valve on, as when turned on full. Gas consumers may experiment for themselves as to the utility of these directions.

The large buildings, especially those several stories in height, such as factories, theatres, hotels, etc., the necessity for gas regulators is very apparent. Owing to the diminished atmospheric pressure in the upper parts of such buildings, the gas always burns more freely in the highest stories than on the lower floors.

A little calculation will show that supposing the atmosphere of uniform density and thus five miles or 26,400 feet in depth, a difference in height of 20 feet, say between two stories would make a difference of a fraction of the atmosphere expressed by 26,400 divided by 20 or one 1320th of the whole weight of the atmosphere or of 33 feet, or 396 inches of water. Now one 1320th of 396 inches is one-third of an inch of water.

Therefore in order to equalize the flow perfectly, a regulator should be attached to each story, so adjusted as to overcome this difference of atmospheric pressure; then in all cases beneficial effects are soon appreciated in the marked economy which it introduces. Although the importance of this instrument is more positively shown in large buildings, yet it ought to be extensively used in stores, dwelling-houses and the like. The saving which it effects is an argument appealing directly to every consumer, and it is a matter of surprise that this being the case, a more extended demand has not yet arisen for the regulator in this country.

Gas companies would find it to their interest to recommend the regulator to their consumers, as it would doubtless tend to obviate much groundless complaint of fancied overcharge, false measurement, etc., which are so frequent. The subject is an important one and deserves a liberal share of attention, and we hope consumers of gas will awaken to the value of the regulator, which as tending to cheapen light claims no small share of their consideration.

THE VIENNA EXPOSITION OF 1873.

The Editor has recently received a number of circulars relating to this subject, and finds his name placed upon two of the "Advisory Committees" appointed with reference to the two classes of Chemical Products, etc., Chairman, Prof. Charles F. Chandler; and Substances of Food as Products of Industry, Chairman, Prof. E. N. Horsford. For this honor he returns thanks, and advises all readers of the GAS-LIGHT JOURNAL who may have occasion to apply for space or information, to do so immediately to Gen. Thos. B. Van Buren, Commissioner General for the United States to the Vienna Exposition, 51 Chambers St., New York. One of the circulars received says:

Congress will doubtless make such appropriation as will relieve the cost of transportation, storage and proper exhibition. The Secretary of the Navy offers two government vessels to sail from New York direct to Trieste for the free shipment of articles to the Exposition.

Articles designed for exhibition should be ready for eqportation by the first of February, 1873.

Since the above was written (which by the way was for the last issue, but crowded out) the following has come to hand;

INTERNATIONAL EXPOSITION.

AT VIENNA, IN 1873.

At a meeting convened by Gen. T. B. Van Buren, U. S. Commissioner for the International Exposition to be held at Vienna, Austria, in 1873, the undersigned was appointed chairman of an advisatory committee on the History of Inventions and Industry. The names of his associates on said committee are hereto annexed. These gentlemen are earnestly requested to aid in carrying out the plan set forth by the President of the Imperial Commision of the proposed Exposition in his "Special Program" for the History of Industry and Inventions.

This project can be accomplished—First, by collecting and forwarding to the Exposition such samples, models, and working machinery as will best illustrate the successive steps of advancement in each branch of art and industry during the last hundred years: Second, by furnishing written descriptions of devices and processes which have been successfully employed for increasing the quantity and improving the quality of natural and artificial productions: and Third, by presenting brief narrations of the leading incidents in the lives of distinguished American Inventors.

Such contributions will both enrich the proposed Exposition, and be of service to the future

historian, who, in searching for the true causes of human advancement, will, by the information thus furnished, be better enabled to trace the origin and development of those ingenious conceptions which have vastly increased the wealth of the world, and surrounded the civilized man of to-day with material resources, comforts and conveniences before unknown.

Any suggestions from members of the committee, touching the best course for expediting the work above marked out, will be thankfully received by Gen. Thomas B. Van Buren, U. S. Commissioner General, 51 Chambers street, New York, or by the undersigned.

SAMUEL D. TILLMAN,
American Institute, New York City.

Our room does not allow of a complete list of the committee appointed by Prof. Tillman, but as the name of the Editor of this Journal appears under the heading of "Devices for the Dwelling; Lighting, Heating, and Ventilating," we can do no less than return thanks for the honor, and in courtesy insert the circular as above.

THE PITTSBURGH DIFFICULTIES.

We have in hand an anonymous letter signed "West End" in reply to, and containing severe strictures on the statements of East End, as well as upon the Reports of the Pittsburgh Gas Inspector, but which we cannot publish, as it is against our rules to admit correspondence from unknown and therefore irresponsible sources. In thus declining, we desire it to be understood that we know nothing of our own knowledge about the subjects in controversy, except in regard to the Inspector's reports, which come under our review in an early issue.

THE CENTRE STREET FIRE.

The recent Centre street fire, by which several persons lost their lives, ought to be warning to printers generally against the use of benzine or naphtha for washing their rollers or presses. We would advise the substitution of turpentine as being more efficient, and absolutely safe. Speaking as a practical printer the writer of this pronounces this agent so much superior to benzine as to more than compensate for the increased cost.

Fire Marshal McSpedon has prepared the following opinion in regard to the above fire:

In continuing this subject I come to the Centre street fire, which originated in the printing office of Dun, Barlow & Co., on the third floor of Nos. 81, 83, and 85 Centre, street. Two boys were washing off the presses with benzine, the vapor from which came in contact with a lighted paper thrown on the floor. The whole place was in flames before the inmates could get from the room in which it originated without danger of being burned. Immediately adjoining the staircase was a large elevator which served as a flue to convey the fire to the floors above, and it did its work most effectually. There was but one staircase in the whole building, and this infernal machine, the elevator, was placed directly against it, and thus all chance of egress was cut off in less than five minutes after the fire starred. The fire-escapes were simply man-traps entirely inadequate to save the occupants, and were in a most wretched condition.

Nothing New Under the Sun.

Humboldt, in his "Cosmos," states that the Chinese had magnetic carriages with which to guide themselves across the great plains of Tartary, one thousand years before our era, on the principle of the compass. The prototype of the steam engine has been traced to the eolipyle of Hero of Alexandria. The Romans used movable types to mark their pottery, and indorse their books. Mr. Layard found in Nineveh a magnifying lens of rock-crystal, which Sir D. Brewster considers a true optical lens, and the origin of the microscope. The principle of the stereoscope, invented by Prof. Wheatstone, was known to Euclid, described by Galen fifteen hundred years ago, and more fully in 1599 A. D., in the works of Baptista Porta. The Thames Tunnel, thought such a novelty, was anticipated by that under the Euphrates at Babylon; and the ancient Egyptians had a Suez canal. Such examples might be indefinitely multiplied, but we turn to photography.

M. Jobard, in his "Nouvelles Inventions aux Expositions Universelles," 1857, says a translation from German was discovered in Russia, three hundred years old, which contains a clear explanation of photography. The old alchemists understood the properties of chloride of silver in relation to light, and its photographic action is explained by Fabricius in "De Rebus Metallicis," 1566. The daguerreotype process was anticipated by De la Roche in his "Giphantie," 1760, though it was only the statement of a dreamer. —*Popular Science Monthly.*

Prof. Henry Wurtz,

Scientific and Practical Chemist and Geologist.

26 PINE STREET, ROOM 36, NEW YORK.
(Office Hours 1 to 4 daily, except Saturdays.)

Geological Explorations and Reports—Chemical Analyses—Advice and Investigations in all the Chemical Arts—Chemical Inventions and Improvements made.

[Prof. W. makes a specialty of GAS CHEMISTRY, and the Analysis of Gas and Coals. Formerly Chemical Examiner in the U. S. Patent Office Practices as

Patent Agent, Counsel and Adviser

of INVENTORS, in all the CHEMICAL ARTS; for which his great general experience in these Arts, and his special experience inside the Patent Office, have qualified him to an unparalled degree.

Prof. WURTZ is Editor of the AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY, a journal whose circulation and patronage is among classes of the community of the highest position, influence and enterprise; and which furnishes therefore an unequalled medium for communication to the general public, of valuable inventions and novel enterprises.

For procuring British and other Foreign Patents promptly, and on moderate terms, Prof. W.'s arrangements are unusually complete and perfect. Inventors may assure themselves of the most *competent*, *diligent* and *faithful* attention to the interests.

GAS WORKS FOR SALE.

THE SUBSCRIBER OFFERS FOR SALE THE GAS WORKS situated in the town of Dover, Delaware. These Works were purchased in the year 1866, at one half less than their original cost, being allowed to run down at that time. Since our purchasing them the consumption has increased 300 per cent. We would prefer to sell to a practical Gas Fitter and Plumber, and will make the terms liberal. The Works are now in perfect running order, and will pay $2000 per annum. We offer these Works for $7000. Our object in selling them is that we have more business than we can attend to. We being large consumers ourselves, we purchased them to furnish our own factory with gas. For further particulars address

RICHARDSON & ROBBINS,
312-2m Fruit Packers, Dover, Del.

FOR SALE,

50,000 TONS OF GAS CANNEL.

E. FOSTER & CO.,
COAL CANNEL AND IRON MERCHANTS,
21 John Street, Adelphi,
LONDON.

E. FOSTER & Co. have for sale Fifty thousand tons of Gas Cannel for delivery over next year. Analysis, 10,000 cubic feet of gas per ton. Illuminating power 23 candles. Coke 12 cwt.

Coals of all descriptions shipped from any port.

GEO. A. McILHENNY'S

PATENT

VACUUM PROCESS,

FOR RELIEVING GAS RETORTS FROM PRESSURE.

Patented in the United States and Great Britain, June 1867 first patent for this purpose in the United States (but not presented to the public until fully tested). Now in successful operation for six years, with most satisfactory results.

The many devices lately brought to the notice of the American public, to accomplish the same results are mostly old English contrivances tried and abandoned years ago, on account of the machinery, stuffing boxes, valves, levers, etc., necessary

But the extraordinary results obtained by the McIlhenny process, have induced some unprincipled persons to bring to the notice of the public, as *recent inventions of their own*, some of these old devices; their purpose seems to be simply to evade the patent.

This process is not only safe, simple and effective, but costs little to apply. The only machinery necessary is a one and a half inch stop cock, and a half inch stop cock to each bench No alteration in the old system is required. In fact, a Works operated with this process, can at any time be operated on the old pressure system, simply by closing the two stop cocks above mentioned. There is nothing to get out of order, nothing that requires special attention; no stuffing-boxes to pack and keep tight, no valves to keep clear of tar and pitch, no levers to lubricate, and no expense for a great amount of machinery.

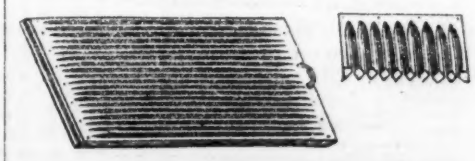
The McIlhenny process challenges the world as regards yield and quality of gas.

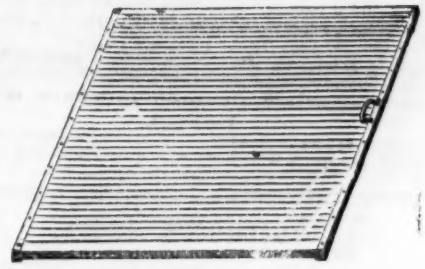
For particulars apply to GEO. A. McILHENNY, Engineer of the Washington, Gas-Light Co., Washington, D. C., or to WILLIAM YORKE, Engineer of the Portland Gas-Light Co., Portland, Me., who will take pleasure in corresponding with any one interested. 307-1y

J. L. Cheesman,

MANUFACTURER OF

Patent Conically and Diamond Slotted Solid Wood Trays.





To Gas Companies.

The above Trays will last longer. and are cheaper than any Tray now used. They are now made without any outside strips, which gives more purifying surface, being perfectly smooth. The lime will not adhere to them as in other Trays. They are now used in over three hundred Gas Companies in the United States, and other places.

JOHN L. CHEESMAN,
151 and 153 Avenue C, New York.

FOR SALE.

An Exhauster,

made by R. LAIDLAW & SON, Glasgow, to pass **150,000** cubic feet per hour. Apply to

W. W. GREENOUGH,
311-4t Treasurer Boston Gas-Light Co.

To Gas Companies.

AN AMERICAN ENGINEER,

who has for many years made Gas a speciality, during which time he has built and managed a number of Works, and is now running one designed and built by himself, desires to change, for reasons which will be given at interview.

Unexceptional refetence furnished as to ability and business qualifications.

☞ Would run a Works by contract or lease.

Address, GAS ENGINEER, Post Office box 241, New York City. 310-2m

TO GAS COMPANIES.

WANTED—A SITUATION BY A MAN FULLY COMPETENT to repair meters, etc. Apply at this office for J. H. 312-2t

The building was just finished, with the exception of a part of the slating, and cost about $16,000. There were about 25 workmen employed in and about the building, who were eating their dinners inside at the time, and escaped by taking refuge under the arches in the center. Two only were slightly injured. The roof was built entirely of iron, and was very heavy. The fall is attributed to the iron rafters bending laterally and causing an immense pressure upon the walls, which had been laid during the last month, and the cement was not sufficiently dried. The easterly side and the northerly end walls were pressed outward, while the westerly side and southerly end walls were drawn and fell inward. The building will have to be entirely reconstructed at an expense of $10,000.—*Boston Daily Advertiser.*

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

JANUARY 16, 1873.

DELIVERED IN NEW YORK.

English Cannel.

Ince Hall	$13 50	@	14 00
Kirkless Hall	13 00	@	13 50

English Caking Coals.

Newcastle Gas	$7 50	@	8 00
Liverpool caking	7 25	@	7 50

British Province Coals.

International—At Mines, $2 00 in currency			— —
Block House—At Mines, $1 50, Gold			6 25
Little Glace Bay—At Mines, 1 60 Gold			— —

Pennsylvania Coals.

Penn Gas Coal—At Amboy	$6 75	@	0 00
Westmoreland	6 75	@	0 10
Shafton	6 00	@	0 00
Youghiogheny—At Baltimore	5 50	@	0 00

West Virginia Coals.

MurphyRun	$6 75	@	0 00
Despard	6 75	@	0 00
West Fairmont	6 87½	@	7 00
American Gas Coal	6 62½	@	6 75
Fairmont	6 75	@	0 00
Newburgh Orrel	6 75	@	0 00
Pinnickinick	6 75	@	0 00
Cloverhill of Virginia	5 25	@	5 50
McKenzie Compound Mixture			8 00

American Cannel Coals.

Peytona of West Virginia	$14 00	@	14 50
Darlington of Pennsylvania			— —
American Cannel	$10 00	@	10 00

Asphalts.

Albertite of New Brunswick	$18 00	@	18 00
Ritchie Mineral of West Virginia	17 10	@	00 00
Trinidad Bitumen	— —	@	14 05

Advertisers Index.

☞ In looking for advertisements, see figures 1 to 12, within brackets, at head of advertisement pages.

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American Meter Co.—West 22nd st., N. Y., Arch and 22d st., Phil., 23 West st., Boston 6
Agency for the Gibson Improvement—W H. Grenelle, 41 Pine street, N. Y. 9
Cast Iron Gas and Water Pipe—Smith & Ellis, York and Meyer streets, Phila., Pa 4
Cast Iron Gas and Water Pipes—R. D. Wood & Co., Philadelphia Pa 3
Cast Iron Gas and Water Pipe—Henry G. Nichols, 14 Platt street, New York 5
Cast Iron Gas and Water Pipe—Jno. McNeal & Sons, 117 Broadway, N. Y. .....
Gas-Burners—C. Gefrorer, 259 Commerce st., Philadelphia, Pa 6
Gas Purification—St. John and Cartwright 6
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry st., Philadelphia, Pa 6
Gasometers, Etc.—Geo. Stacey & Co., Cincinnati, O 3
Gas Fixtures, Etc.—Mitchell, Vance & Co., 597 Broadway .. 4
Gasholders, Etc.—Delly & Fowler, 39 Laurel st., Philadel .. 4
Gas and Water Pipes—B. S. Benson & Son, Allentown, Pa .. 5
Gasometers, &c.—Keystone Iron Works—2132 Filbert st., Philadelphia 4
Gas Screens—American Gas Screen Manufacturing Co., Haverhill, Mass 1
Jersey City Gas Meter Works, 14 Morris st., Jersey, N. J ... 3
Northwestern Gas and Water Pipe Co.—646 Wabash Ave., Chicago, Ill 7
Patent Conically Slotted Wood Trays—John L. Cheesman, 147 and 149 Avenue C., N. Y. 5
Patent Gas Exhauster—Smith & Sayre, 95 Liberty stireet .. 9
The Gas Light Co. of America—Box 5220, New York city ... 4

GAS COALS.

Despard Coal Co.—Parmelee & Bros., Agents, 32 Pine st., N. Y. 4
Gas Coals—Bird, Perkins & Job, 86 South st., N. Y. 5
Grahamite or Ritchie Mineral—27 South Charles street, Baltimore, Md. 8
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Continental Works—T. F. Rowland, Greenpoint 5
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Gloucester Iron Works—J. P. Michellon, Sec., 6 North 7th street, Phila., Pa 7
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Providence Steam and Gas Pipe Co., Providence, R. I.—H. A. Branch, Agent 4

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Manhattan Clay Retort Works, 15th st., near Av. C, N. Y.. 8
Philadelphia Fire Brick Works, Vine and 23d sts., Phila.... 8
Retorts, Etc.—Geo. C. Hicks & Co., Baltimore Md 6

LAMPS, STOVES, PETROLEUM, ETC.

Patent Lamp Post—J. W. Graham, Chillicothe, Ohio, or A. M. Callender, office of this Journal 9

MISCELLANEOUS.

Architect and General Gas Engineer—William Farmer, 111 Broadway Room 91 3
A Synopsis of British Gas Lighting—Jas. R. Smedberg, San Francisco, Cal 4
American Journal of Science and Arts—Silliman and Dana, New Haven Conn. 7
Contractors for Gas Works, Etc.—Murray & Baker, Fort Wayne, Ind 5
Fodell's System of Bookeeping—A. M. Callender & Co., 42 Pine st., New York 8
Journal of the Franklin Institute—Prof. W. H. Wahl, Franklin Inst., Phila., Pa 4
On the Advantages of Gas for Cooking and Heating—Magnus Ohren, Lower Sydenham, London, S. E 5
School of Mines, Columbia College, East 49th st 5
Scientific and Chemical Expert—Prof. H. Wurtz, 26 Pine street, room 36, N. Y 7
Screening Shovels—O. R. Butler, 126 Maiden Lane, N. J 4
Works upon Gas—D. Van Nostrand, 23 Murray street and 27 Warren street, N. Y 9

AMERICAN

GAS SCREEN MAN'F'G COMPANY.

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Your attention is respectfully called to the GAS SCREEN now being manufactured by the American Gas Screen Manufacturing Company, under the patents granted to E. DUFFEE, and are pleased to submit the following points of their excellence and superiority over all other screens now in use.

The Screen is made with an oak frame, interlaced with split rattan, drawn through holes at regular intervals in the Frame and cross-pieces, the edges of the frame being grooved to prevent abrasion.

The advantages of the screen are:

1st. The large purifying surface, the construction of the Screen giving over three-fourths of the surface for the gas to penetrate the lime.

2d. On account of the free passage of the gas through the Screen the pressure is reduced, thereby preventing the accumulating of carbon on the retorts.

3d. The saving of lime and labor, as the Screens are not liable to clog, and are easily cleaned.

4te Their cheapness and simplicity of construction.

5th. Their DURABILITY—they can be used longer than any other now used.

Testimonials.

PROVIDENCE, RHODE ISLAND, March 21st, 1872

LUTHER DAY, Esq., Agent, etc.

Dear Sir: The Trays manufactured by you for our West Station were put in use in September last, and have *given perfect satisfaction.*

The frames are well put together, and I see no reason why they will not last for a long time. The *very large amount of open space* in these Trays gives the gas an easy passage, and brings it into contact with the lime much better than when the space is so contracted, as is the case in most of the other Trays in use.

The pressure thrown upon the retorts by contracted passages is very great and were gauges used more frequently than they now are in many gas-works, this facat of having *open Trays* would become more apparent to mangers of gas works. The digerence in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

The amount of gas purified, per bushel of lime used to this date, is six thousand five hundred and fifty six (6,556) cubic feet.

Respectfully yours,
JAMES H. ARMINGTON, Supt.

BOSTON GAS-LIGHT CO., Dec. 1871.

Dear Sir: In answer to your inquiry how we like your Patent Tray for dry gas purifiers, I take pleasure in saying we have used them exclusive of all others, for the last three years, and think them far ahead of any yet offered. The surface being nearly three times that of any other Tray, and their lightness and durability perfectly satisfactory.

Yours respectfully,
A. M. GILES.

EDWARD DUFFEE, Esq.

EAST BOSTON, JUNE 15, 1871.

Gentlemen: We have used your Screens some five years. They give perfect satisfaction.

I consider them *by far the best Screen* for Dry Lime Purifiers I have seen. Yours truly, A. M. NORTON, Supt.

CHELSEA, May 1, 1871.

Mr. E. DUFFEE.

We are using your Purifying Trays, and find them to be the *best of any* that I have used, and will *purify more gas with less pressure* than any tray that I know. I can fully recommend them, after four years trial, to any Gas Superintendent with perfect safety, as the *cheapest and best Tray made.*

Yours truly, JOHN ANDREW, Sup't.

DORCHESTER, March 3. 1870.

Mr. E. DUFFEE.

Dear Sir: We have had your Gas Trays in constant use for almost one year and six months, and find them superior to any others we have ever used, both in point of economy and efficiency. Truly yours, W. B. BROOKS,
Agent Dorchester Gas-Light Co.

JAMAICA PLAINS, MASS., June 21, 1871.

EDWARD DUFFEE, ESQ.

Dear Sir; The Trays ordered by this company three years ago, are getting somewhat worn. I wish to say here that I consider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like the sample shown in every way, and oblige Yours truly
JAMES F. ROGERS,
Sup't Jamaica Plains Gas-Light Co.

BROOKLINE, June 11, 1871.

E. DUFFEE, ESQ.

Dear Sir: You will please make a set of Gas Trays for this company as soon as convenient, at price named. In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country. Respectfully yours,
H. A. ALLYN,
Sup't Brookline Gas-Light Co.

BANGOR, August 2, 1870.

EDWARD DUFFEE, ESQ.

Dear Sir: Yours of the 20th ult. is received. In regard to your Gas Trays, I take pleasure in saying that they have been in use over two years, and have given perfect satisfaction and they are in good order at the present time; should have no hesitation in recommending them, believing they are the most durable and easiest kept in order of any with which I am acquainted. Respectfully yours,
W. H. PERRY, Sup't.

OFFICE OF THE SPRINGFIELD GAS-LIGHT CO.
SPRINGFIELD, MASS., Oct. 10, 1871.

Mr. WARD,
President Hartford Gas-Light Co.

Dear Sir: I have been using Gas Screens made by the American Gas Screen Company, for nearly a year, and find them superior in every way to the wooden Screens made and formerly used by the Springfield Gas-Light Co. I can purify more gas with the same quantity of lime, there being more surface to the Screens; and I consider them more durable, and recommend them to your consideration.

Yours with great respect,
GEORGE DWIGHT.

ROXBURY, June 14, 1872.

EDW. DUFFEE, ESQ.

Dear Sir: In answer to your inquiry regarding your Patent Gas Screens, I am happy to be able to say, that after nearly three years constant use we are perfectly satisfied with them being able to purify over fifty pet cent. more gas with them, than with any other Screen we have used.

Yours respectfully,
THOMAS J. PISHOU.

OFFICE DETROIT GAS-LIGHT CO.,
DETROIT, MICH., April 22, 1872.

AMERICAN GAS SCREEN MANUFACTURING CO., HAVERHILL.

Gentlemen: The Screens bought of you work far better than any we have ever used. As a proof, we have with the same quantity of lime purified *twenty per cent.* more gas with your Screens than with any others, and the work well done. The workmen are also better pleased with them—they being light and handy to work. They also relieve the pressure very much upon the retorts, and I cheerfully give you my experience.

Yours truly,
P. E. DEMILL, Secretary.

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REFERENCES:

CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
SAMUEL DOWN, President American Meter Company, N. Y.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
CHARLES MOWTON, Engineer New York Gas-Light Company, N. Y.
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Prof. HENRY WURTZ, Editor AMERICAN GAS-LIGHT JOURNAL.
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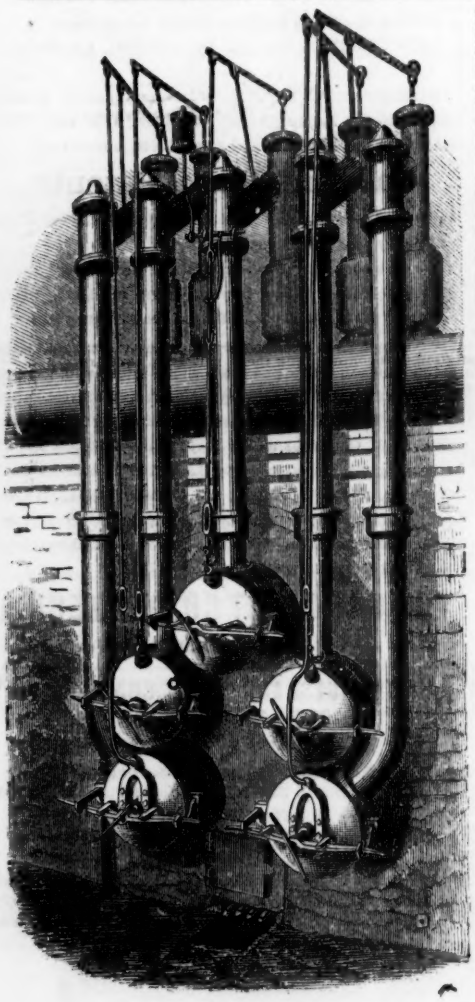
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal. [254-



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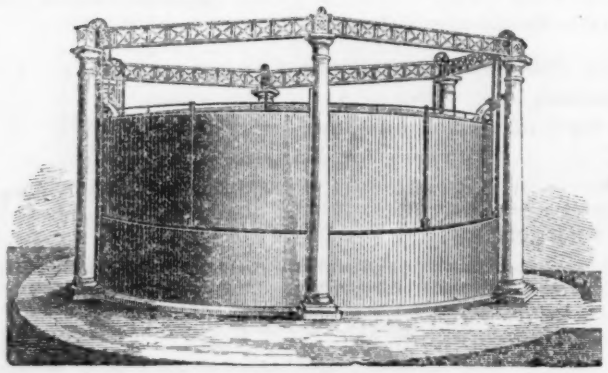

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We are also prepared to contract for putting said process into successful operation in your works, furnishing all the necessary plans, materials, and workmen for that purpose.

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*** Reference to them is requested 204-1y

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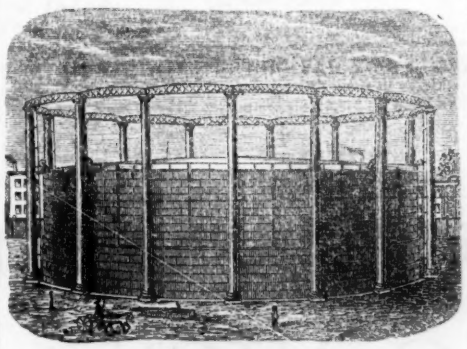

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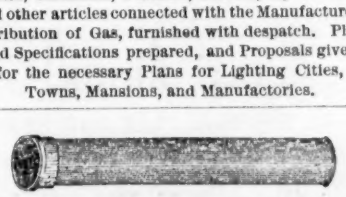

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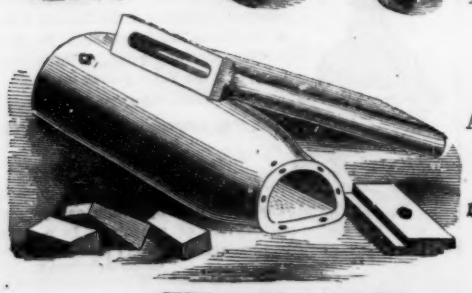

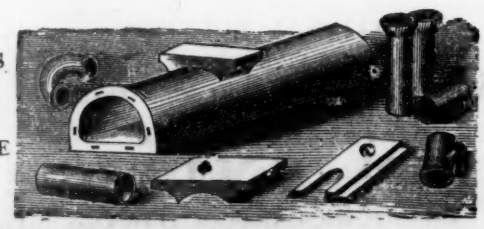

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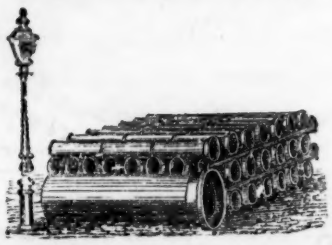

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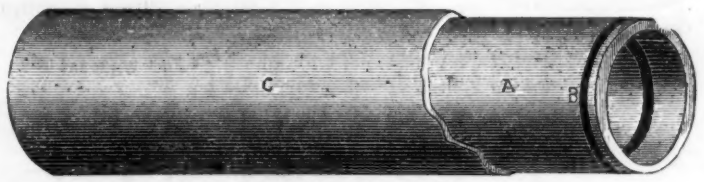

FIG. 2.

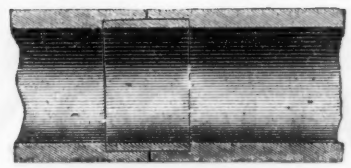

FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3—Horizontal Section and Connection.

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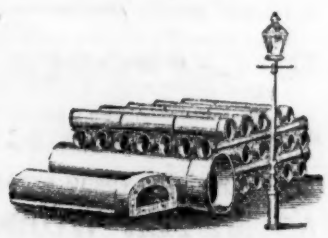

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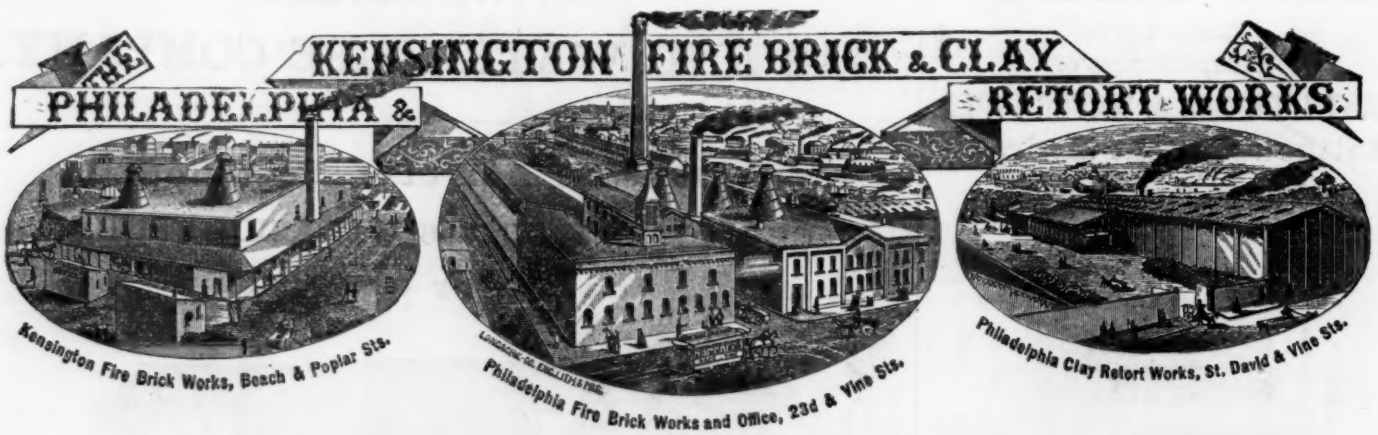
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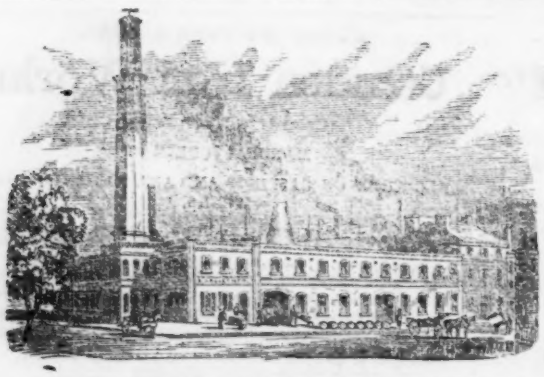

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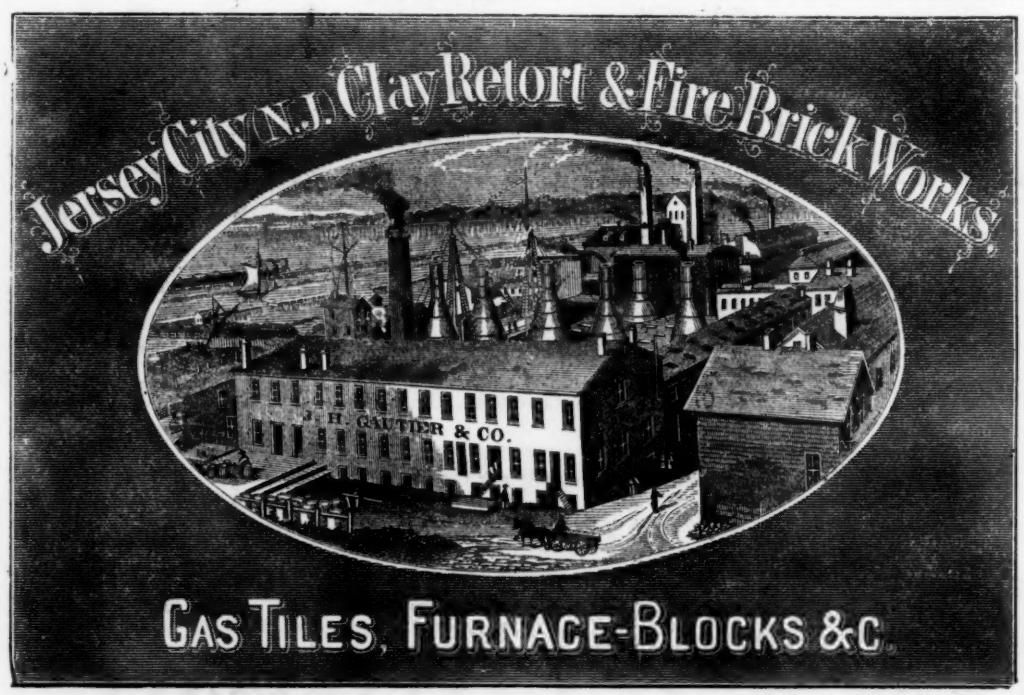

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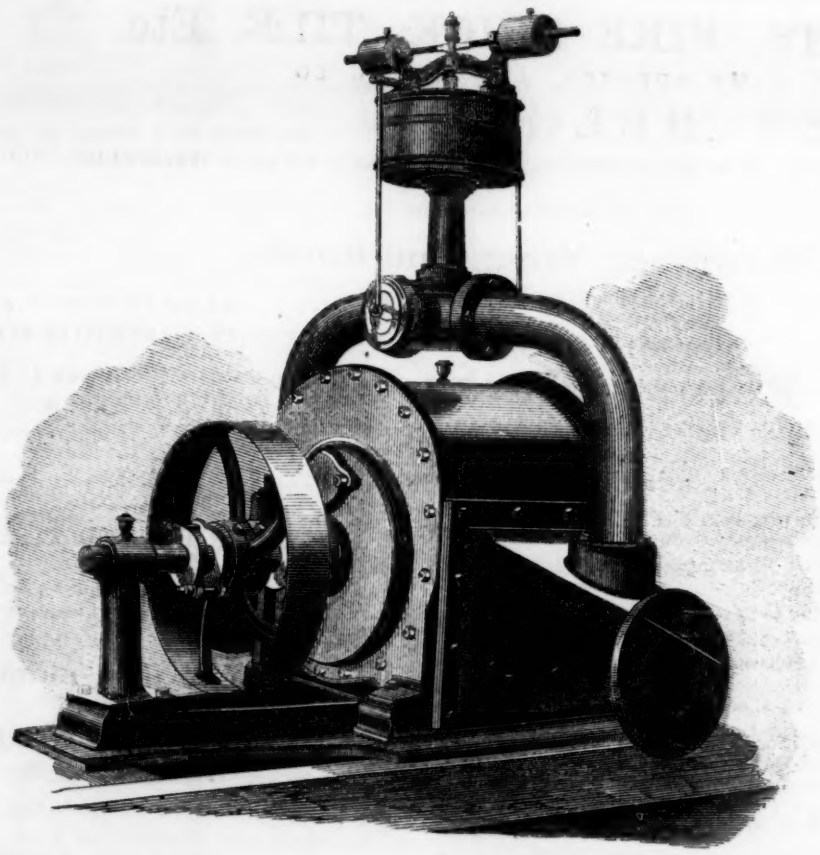

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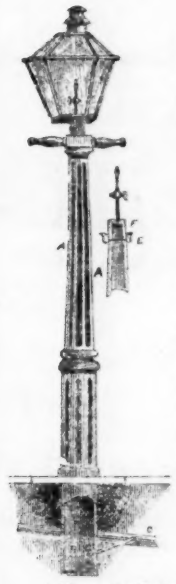
GRAHAM'S

Patent Anti-Freezing LAMP POST.



THE BEST, CHEAPEST AND MOST DURABLE POST EVER OFFERED TO THE PUBLIC.

WOOSTER, OHIO
Jan. 24, 1871.

J. W. GRAHAM,

Dear Sir: Yours of the 14th inst at hand. In reply I would say that we have tested the six anti-freezing Lamp Posts purchased from you, and find them to be all as you represented. Whilst nearly a dozen of our sixty-five Posts were frozen down last month and first of this not one of yours was affected by the heavy frost. What can you sell them at?

Yours truly,
LUCAS FLATTERY
Sec'y Wooster Gas-Light Co.

Address the Patentee,
J. W. GRAHAM,
Chillicothe, Ohio.

250-9t

AGENCY FOR

GIBSON'S IMPROVEMENT

IN THE

Manufacture of Coal Gas,

41 PINE STREET, ROOM 1.

The undersigned having been appointed Special Agent for the introduction of GIBSON'S Substitute for Dip-Pipes in the Manufacture of Coal Gas, respectfully presents for the consideration of Gas-Light Companies the Circulars and Pamphlet issued by the American Coal Gas-Light Imp. Co., descriptive of the value of GIBSON'S Improvement, and the mode by which Gas-Light Companies can satisfy themselves of its usefulness, without trouble or expense, at their own works.

Orders for fitting up Valves of any desired form or patent, *subject to the generality of the Gibson claim*, and also for SUPPLIES and MATERIALS of every description required for the use of Gas Light Companies promptly attended to by

W. H. GRENELLE, Special Agent.

REFERENCE.—RICHARD MERRIFIELD, Esq., late Vice President MANHATTAN GAS-LIGHT COMPANY.

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Established 1821,

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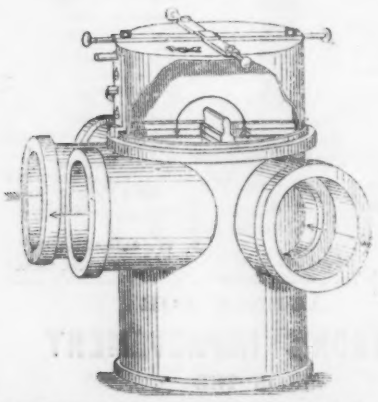
FOR GAS WORKS MACHINERY, ADDRESS CORNER FIFTH AND TASKER STREETS, PHILADELPHIA.

Manufacturers and Builders of Gas Works, &c., of all Descriptions, of the Most Approved Plans.

No. 1.



By Pass with Drip for Single Apparatus.

Messrs. Morris, Tasker & Co., respectfully ask the attention of Gas Engineers and others, interested in the erection of Gas Works and the manufacture of Gas for illuminating purposes, to their new and improved By-Passes, which are made from entirely new and original designs.

They are constructed with water seal compartments to pass the gas through the required channels without leakage; with drip chambers to catch the water of condensation, tar, and ammoniacal liquor; and also with a loose or circular valve, to control the direction of the gas flow.

The By-Passes shown in the annexed illustrations, are similar in construction and varied in size to suit works of different capacity

No. 1 is a By-Pass for Gas Works of small generating power, and using but a single apparatus; the gas from the retorts enters the proper nozzle, as shown by the arrow, and being deflected by the diaphragm of the valve over one of the vertical partitions of the drip chambers, it passes through one of the nozzles to the meter and returns to be again deflected by the rotary valve to the gas holder.

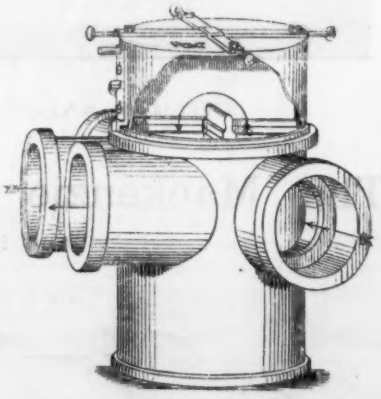
No. 2 is a By-Pass for using two apparatus, the gas is entered and the direction of its current is controlled similarly to that of No. 1, just described.

No. 3 is a By-Pass for passing the gas around the meter or not, according to the set of the loose or circular valve.

No. 4 is a sectional view of No. 3, and fully illustrates the construction and arrangement of the various By-Passes; the vertical partitions P are placed at right angles and divide the By-Pass into four drip chambers, they extend to within a short distance of the bottom to allow the water W, which forms the water seal, to circulate freely; the valve V is constructed with a diaphragm which divides it diametrically, the edges from ground joints with the upper edges of the partitions P, to prevent the gas from leaking from one chamber to another, and also to protect the ground surfaces from the corrosive action of the gas.

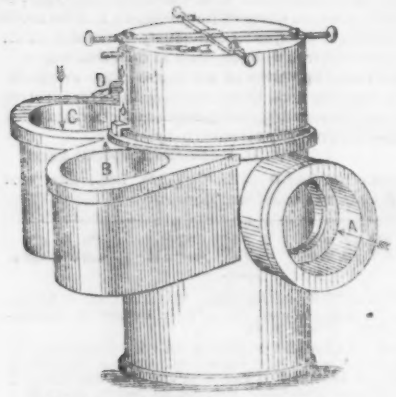
No. 5 is a single By-Pass with Drip Chambers.

No. 2.



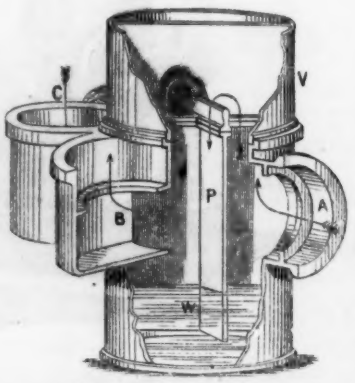
By Pass with Drips for two Apparatus.

No. 3.



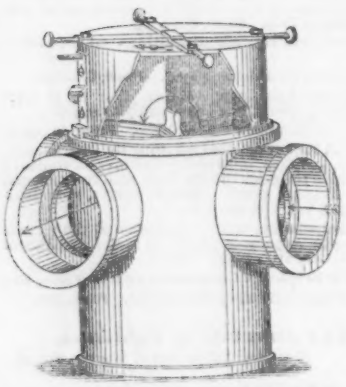
Meter By Pass with Drip.

No. 4.



Section of No. 3.

No. 5.



Single By Pass with Drip.